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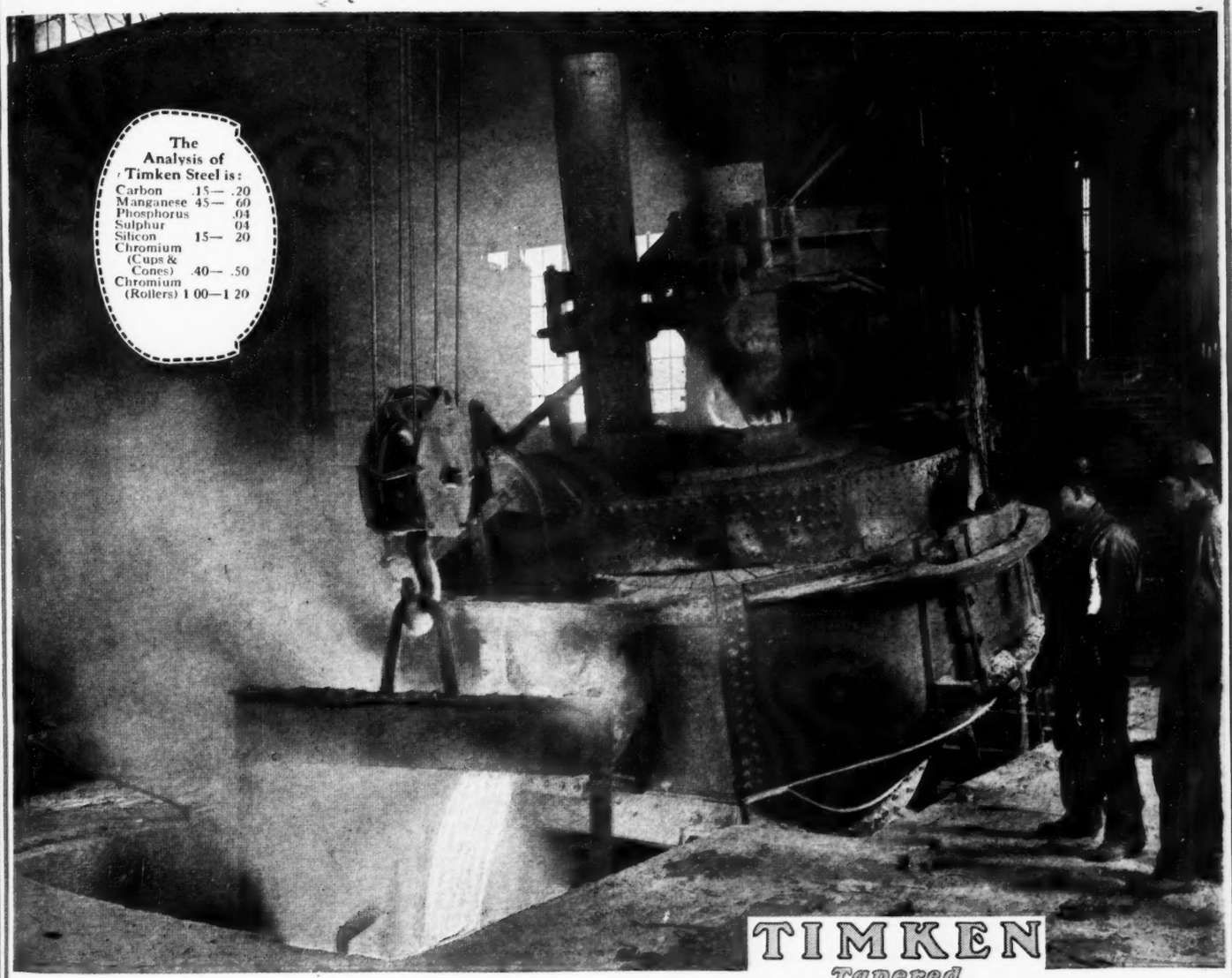

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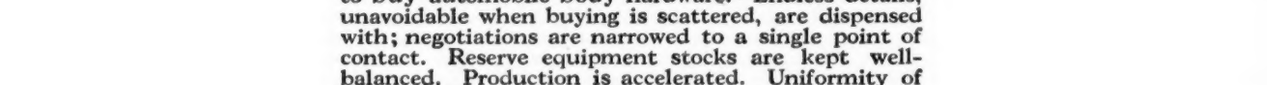

AUTOMOTIVE INDUSTRIES
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VOL. XLVIII NEW YORK—THURSDAY, MAY 31, 1923 No. 22

Spring Dating Should Be Banished from Tire Marketing

Policy has outlived its usefulness and now causes trouble for both dealers and manufacturers. Extensive use of closed cars makes selling of automotive equipment all-year-round business. Economic trends affect production more than seasonal variations.

By Norman G. Shidle

NOTHING hinders progress so much as an obsolete method, entrenched by habit and custom, continued after its reason for existence has passed and its period of usefulness has been outlived.

Spring dating bears just this relation to tire merchandising at the present time. The tire manufacturer gains nothing from it, while the dealer is harmed in a majority of cases. The evils it engenders demoralize the retail tire market in a way which ultimately is reflected by instability in the manufacturing branch of the industry.

Not all tire executives will agree with these statements. Some are inclined to believe justification still exists for long datings, but a majority think they have outlived their usefulness. A few characterize them as "the curse of the tire industry." No manufacturer feels he can afford to discontinue long datings unless assured that other important companies will fall into line. Consequently, they are still being used even by those organizations whose executives decry them most.

Certain definite evils can be traced directly to spring dating, while the advantages claimed for it seem to be largely fictitious. Tire merchandising troubles which may be laid at the door of spring dating are:

1. Dumping of tires on the retail market at a cut price just at the time of year when profitable sales should be easiest to make. This comes about because dealers frequently buy more tires than they need. It is a natural result of ordering four to six months ahead without the necessity of investing any money in stocks. When dealers fail to sell the tires before payment falls due, they get rid of the surplus in any way and at any price possible.

This has happened many times and has been an important factor in demoralizing the retail market. It has helped materially to destroy public confidence in the tire industry and to make meaningless a tire list price. It has broken the market for the manufacturer's spring production which otherwise might have been sold at a large profit.

2. Under certain conditions it has enabled dealers to sell tires during the winter at less than list price. Obtaining stocks without financial investment, the dealer who pushes his winter business often is willing to take a smaller profit and get rid of them well before his payments are due.

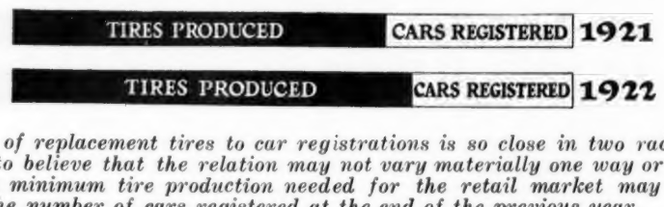
AGAIN the result is a demoralized retail market which is reflected in strong sales resistance for tires being sold at the normal profit. It convinces the public that tire list prices are highly inflated and concentrates all the buyer's attention on the price feature.

In a case of this kind the manufacturer is simply financing the dealer's business. Such methods do not educate dealers in sound merchandising.

3. It has imposed upon the tire maker a heavy finan-

Relation of Replacement Tire Production to Car Registrations

(Showing stability of relation in two years, each of which differed materially from the other as regards general business conditions. There were 2.13 tires produced in 1921 for every car registered at the beginning of that year. In 1922 the proportion was 2.45 to 1.)



If the proportion of replacement tires to car registrations is so close in two radically different years, there is good reason to believe that the relation may not vary materially one way or the other in any year.

Consequently, the minimum tire production needed for the retail market may be gaged reasonably well on the basis of the number of cars registered at the end of the previous year.

Automobile production would then be the only important variable in estimating tire production needs. This can be watched carefully from month to month and even estimated fairly well for a year ahead.

cial burden for which he is not recompensed in any material way. Interest on the money tied up in spring dating stocks might well be put to use in advertising and sales helps which would return profits to both manufacturer and dealer.

4. It tends to nullify the effects of price changes in the tire field, because dealers get the advantage of both rising and falling prices.

Cut-rate sales are made possible because of this fact and the detrimental effects already mentioned follow:

Many months must pass before the manufacturer begins to get the benefit of a price increase. By that time conditions may have so altered as to dictate another price change. Manufacturers in any industry find it difficult to calculate the proper time for and the probable effect of a price revision. The complexity of the problem is increased materially when it is necessary to calculate the effect of a price cut, announced on a given date and put into practical effect several months later.

Favorable Arguments Not Convincing

These major points indicate the wide scope of the troubles brought about by the policy of spring dating. Arguments in favor of the policy are less convincing. Following are the reasons given most generally in its support:

1. It tends to stabilize tire production. If spring dating were not used, it is claimed, tire production would drop materially in the winter months.
2. It provides adequate warehousing facilities for tires produced during the winter. If production were maintained at a reasonable level and spring datings were discontinued, manufacturers would not be able to store the stocks accumulated.
3. It provides the dealer with stocks adequate to meet the spring demand. Otherwise he could not get tires quick enough to meet the rush when it began.

Each of these claims is founded on a somewhat unsound basis when reviewed in the light of conditions today.

Tire makers have a better chance to predetermine replacement markets than most manufacturers of fabricated products. The number of tires bought varies directly with the number of automobiles in use. Car and truck registrations are available in great detail and can be used readily in estimating a minimum replacement demand.

Tires must be bought as long as cars are kept running. In a period of depression automobile owners may stop buying every other sort of automotive equipment, but they must continue to purchase or put up their cars. Some vehicles are sent to storage in such times, but the effect on tire sales is gradual. It is not to be compared with that of lowered production on car factories.

Manufacturer Can Forecast Replacements

The automobile manufacturer has no such opportunity to gage replacement needs. His estimates involve many variable and abstract considerations, and predictions must be made on the basis of very meager information. Still it has been possible to work out a method by which car replacements can be prophesied with some degree of accuracy. The tire manufacturer is much better able to forecast replacement markets accurately.

The number of tires built for original equipment may vary more widely as it is entirely dependent on the trend of car and truck production. But even this can be estimated reasonably well for a brief period ahead.

Individual tire makers have a more complex problem in determining the proportion of the total market each will be able to get, but considerable progress will have been made when the industry as a whole begins to calculate probable demand conservatively and to organize its production schedule on that basis.

Short-time estimates are safest until far better means are discovered than those now available for judging future sales. Spring dating involves gambling with the future for some four to six months and consequently has many dangers connected with it.

Spring dating did have a stabilizing effect of some importance on production in the early days of the industry. Automobiles were used in the winter only to a very limited extent, while trucks offered no large market for tires.

Seasonal Changes of Minor Importance

Both cars and trucks are used almost continuously at the present time. The number going out of use in the winter months is growing smaller every year. The tremendous growth of closed-car production since 1916 has made seasonal changes of relatively minor importance. In 1916, 1.5 per cent of the cars built were closed models, while 27 per cent of the entire 1922 production comprised closed jobs. The percentage has gone up every year since 1916 and will continue to go up rapidly. It was held down last year only by the inability of body plants to supply the demand.

This increased use of closed cars affects the situation chiefly in the Northern States. At least half of the area of the United States, it must be remembered, has a cli-

mate sufficiently warm to permit the operation of open cars with a reasonable degree of comfort even in most of the winter months.

Trucks are used entirely for business purposes and consequently are operated throughout the year in a large majority of cases. Their use is governed by the seasonal character of the industries in which they are operated, but not directly by weather conditions.

Considering these factors together, it becomes evident that the use of motor vehicles is affected by seasonable variations only to a limited extent. Selling automotive equipment has become an all-year-round business as a result.

Spring Dating No Longer Serves Purpose

Whether spring datings were discontinued or not, there still would be fairly large sales of tires throughout the winter, so that production schedules could be maintained at a reasonable level. This conclusion is borne out by the fact that many dealers have bought good-sized stocks of tires in December in recent years and have sold them all before the time for payment came around. Such dealers obviously did not have need of spring dating privileges. Had his accommodations been withheld, tire production schedules would not have been curtailed seriously.

Spring datings are more likely to make production schedules variable, as a matter of fact, than to hold them level. The reason for this goes back to a statement made in the first article of this series:

"Volume of production is influenced more strongly by business and current economic conditions than it is by seasonal factors."

Spring dating was designed to remove from the production curve peaks and valleys which might be caused by the effect of seasonal changes on retail sales. But such changes are not now of primary importance, as has been shown. Fluctuating economic conditions have much greater bearing on estimated demand and they have not been fully reckoned with in the past.

Suppose large stocks of tires are sold in December on a four or five months' dating. Business is good, salesmen are enthusiastic and dealers are optimistic. Nevertheless, a considerable change may come about in the economic situation within four months. If a slump sets in, retail sales begin to slow up and the end of the dating period arrives with quantities of unsold merchandise on the dealers' shelves.

Factory production is forced down to a low level. Not only has the demand for *more* tires ceased, but the manufacturer is faced with the return of large stocks of unsold tires, previously sent out on a spring dating basis. The alternative is dumping huge numbers of tires on the market to be sold at whatever price they will bring. The result is obvious.

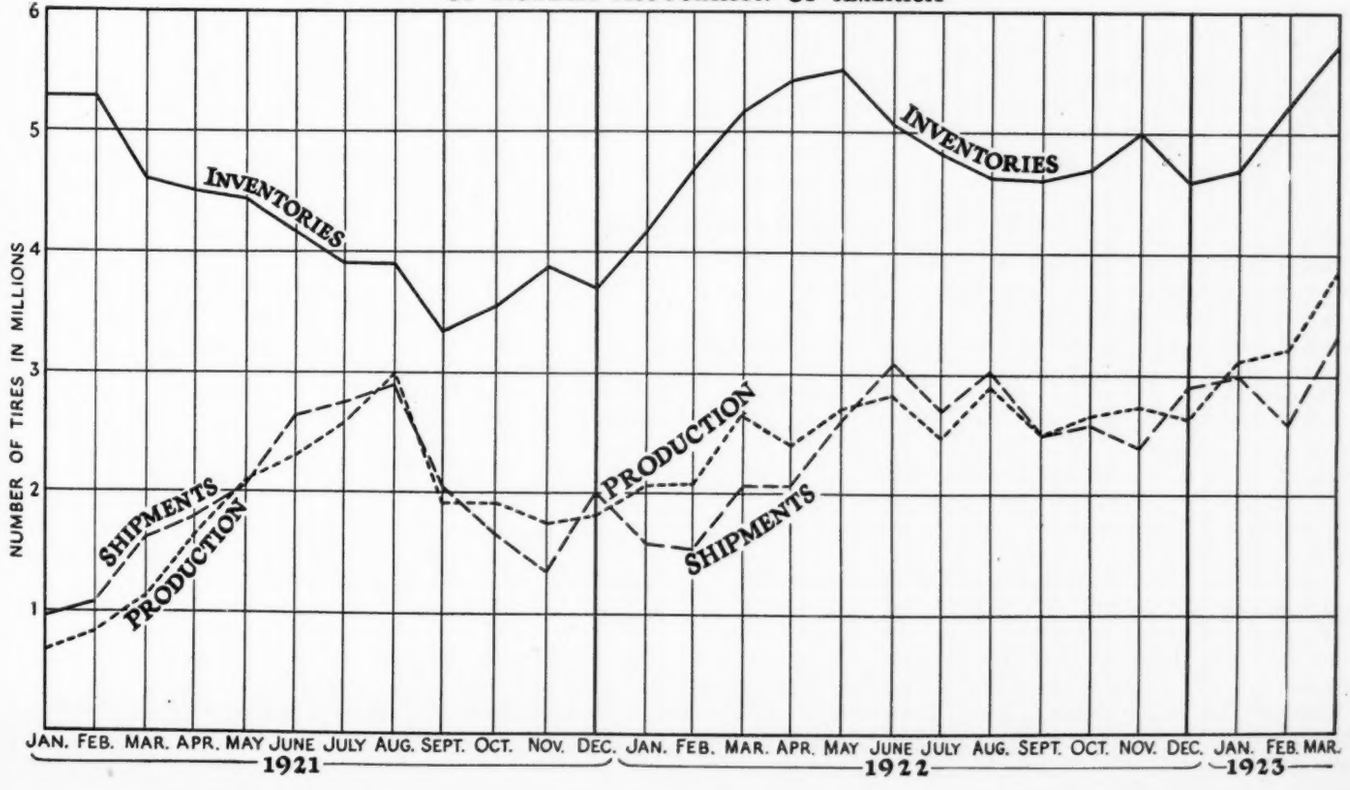
Even if the demand has been under-estimated and business improves during the dating period, the production curve is not stabilized. Factories must be suddenly speeded up to meet a demand, which they had considered already taken care of to a large extent by spring datings. Sudden changes in the production schedule, whether up or down, usually carry with them considerable inefficiency and waste.

Effect of Economic Changes

Sufficient data are not available and not likely to be for some time, to determine very accurately the probable effect on tire sales of possible economic changes. If tire manufacturers adopt a policy of shipping to dealers, only, on a thirty and sixty day basis, as is common in more stabilized industries, they have far less chance of misjudging business trends for the shorter period and consequently have a much better opportunity of evening out the production curve.

Spring datings, as related to production, are concerned only with seasonal considerations which are relatively

MONTHLY TIRE REPORT SHOWING
INVENTORIES, PRODUCTION, SHIPMENTS OF PNEUMATIC CASINGS BY MEMBERS OF RUBBER ASSOCIATION OF AMERICA



unimportant. Consequently, there is no sound basis for the statement that spring dating has a marked effect in stabilizing the production curve of the tire industry.

The other two claims made in favor of spring dating—provision of warehousing facilities and of stocks to meet the spring demand—have been nearly disposed of in the discussion of long datings as related to production stability.

No Accumulation in Winter Months

Consistent sale of automotive equipment throughout the year indicates that no stocks of unusual size would be accumulated in the winter months even if spring datings were discontinued. A large number of the tires shipped last December, for instance, when the spring dating shipments began, would have been shipped anyhow. Inventories, moreover, did not approach warehouse capacity in that month. A concrete example will bring the point out more clearly.

While the data used must be somewhat general, they are close enough to prove the point. It is assumed that the figures of the Rubber Association of America comprise 75 per cent of the total for the tire industry. By this rough figuring we find:

December shipment of casings.....	3,912,000
Shipped to car factories for original equipment (probably)	1,104,000
Leaving 2,808,000 shipped to dealers for retail sale.	

Estimating very conservatively, it may be assumed that 60 per cent of this 2,808,000 would have been shipped in December, even if spring dating had been discontinued.

That would mean that 1,123,000 extra tires would have had to be warehoused in December if spring dating had been discontinued.

Inventories in December actually were about 6,132,000. The total with 1,123,000 added would have been 7,255,200.

Warehouse Facilities Sufficient

Inventories in May, 1922, were about 7,364,000. Assuming that this represents the warehouse capacity of the industry, there would have been a surplus of warehouse capacity for 108,800 tires in December, if a discontinuance of spring dating had resulted in a decrease of 40 per cent on retail shipments. And there is no reason to believe that elimination of spring dating would bring about any such reduction in shipments to dealers.

Thus, conservative calculations on the basis of what data are readily available, show clearly that there are already more than sufficient warehouse facilities to take care of any decrease in shipments that might result from an elimination of spring datings. Moreover, the use of public warehouses for tire storage has not been carried nearly so far as it may yet be.

Dealers could be supplied with enough tires to take care of their spring business if they were billed on a 60-day basis. The fact that seasonal changes influence sales only to a limited extent make it certain that radical changes would not be necessary in production and shipment programs to take care of dealer needs on that basis.

A superficial survey might make it appear as though some advantages accrue to the dealer from spring dating. This is probably the main reason for the continuance of the practice. Keen competition among manufacturers leads them to extend what are seemingly advantageous inducements to retailers. Many progressive dealers, however, have come to the conclusion that they lose more than they gain from long datings. Countless cases exist to prove that trade demoralization, rather than dealer profits, result from the custom.

In the extreme northern sections of the United States there may still be some excuse for spring datings. Where snow lies on the ground for long periods and where transportation is seriously impeded in winter, dealers may still have to be sold tires on long datings, but no real advantages are to be gained anywhere else.

The custom brings trouble to the dealer in the following ways:

1. Causes overstocking in many cases. This makes necessary price-cutting and "dumping" when payments fall due.
2. Encourages firms in bad business practices. When he can sell off stocks at cut rates before dating payments are due, he demoralizes the tire market. This reacts on him if he is trying to make a permanent success as a tire merchant.
3. Ability to take advantage both of price cuts and price increases during dating period leads him into selling practices which would be impossible were it not for spring dating. The result is the public is convinced the tire industry is a "gyp" business. The dealer feels the effect of this in future transactions.

Overloading a Common Occurrence

The first two of the previous statements may seem to be contradictory, but both of them are true. Overloading is a common occurrence while good business conditions in a favorable territory often enable a dealer to cut prices and sell out profitably before payments are due.

It may be argued that the dealer should have business sense enough not to buy too heavily, but the fact remains that he does. It is human nature to do so under the circumstances. His misjudgment results in various steps on his part to take care of obligations when they fall due. The consequent confusion is hurtful to everybody involved in the production and sale of tires. The manufacturer may be justified in saying "Am I my brother's keeper?" but that will not help him to avoid the consequences of his brother's deeds which react unfavorably on both the parties concerned.

A tire dealer can hardly be expected to have an accurate knowledge of what business conditions and tire sales in his territory will be four or five months in advance. He is not an economist and probably never will be one. His business vision is necessarily limited to a short period in the future, so far as market demand is concerned.

In buying he must determine not only the number of tires he needs, but also the number of each of the various sizes. This complicates his problem still further. Many dealers have bought tires on spring dating only to find themselves overstocked with certain sizes that they can't sell and understocked with sizes for which there is considerable demand.

No Gain in Stability

Spring dating, with the evils of overloading and price cutting that follow in its wake, is not conducive to stability in dealer organizations. Its results reduce public confidence in the tire industry and make good retail merchants steer clear of selling tires.

The tire maker already recognizes the relation of spring dating to his production and marketing programs. At one time spring dating was done largely on a trade acceptance basis and the manufacturer was aided financially by the negotiable paper accumulated. Nearly all spring dating is now done on open account, however, so

the manufacturer bears the entire burden. Even when trade acceptances are required, he usually has to indorse the paper as banks refuse to lend money on the signature of most tire retailers.

Firmly financed, automotive equipment retailers do not require four or five months' dating to carry on their business. Any tire dealer who actually needs such terms is not likely to be an asset to a tire organization anyhow. Dealers neither expect nor receive similar credits on any other equipment items. A tire is relatively a large unit as automotive parts and accessories go, yet that very fact would make it appeal more strongly to well-financed and capable retailers if conditions were made favorable for its sale.

Concerted Action Needed

The limited effect of long datings on tire production already has been demonstrated, together with the presence of adequate warehouse facilities. The ill effects on dealers have been pointed out. They exist despite the fact that most of the factories involved are usually considered entirely favorable to the retailer. Their favorable character appears to be temporary and superficial, however, rather than lasting and progressive. These ill effects come to the dealer because price-cutting, which frequently results from long datings, throws the retail market into confusion and hurts future sales materially.

Tire manufacturers seem to have nothing to gain from long datings. They have to carry a heavy financial burden, speculate on collections which depend on business trends, take chances on returned stocks at times when least able to handle them and lose the benefit of price rises or reductions which go into effect during the dating period.

Their only possibility of benefit is through helping dealers to become firmly established as good merchants so that they will return profits indirectly through increased sales. This benefit is not received because long datings hinder rather than help dealers in general.

Spring datings persist chiefly through inertia. Concerted action of some kind is necessary if they are to be wiped out. The subject would not be a new one for tire manufacturers to discuss in their rubber association meetings. It has been talked about officially and unofficially more than once. No action has yet resulted, although the practice of spring dating has outlived whatever usefulness it once may have had.

The mileage guarantee was done away with in 1922, after a long period of discussion. With its passing the tire industry will save some $17,000,000 every year. The mileage guarantee was a deeply rooted custom that had hung on to tire merchandising for many years after it had any real reason for being. It was being abused constantly and could not be continued without continuing as well the abuses that went with it.

The status of spring dating is similar in every respect. Its elimination will do more, perhaps, toward stabilizing tire selling methods and, indirectly, toward restoring public confidence in the tire industry than any other single step that might be taken by manufacturers.

British Exporters Urged to Follow American Export Practice

BRITISH motor vehicle manufacturers are making a strong bid to capture the Colonial market. They feel that they can regain their former position of strength if they cooperate among themselves and make the most of existing opportunities. Some idea of the competition which the British manufacturer intends to give the American producer may be gathered from an article on the Colonial automotive market appearing as a trade supplement to the *London Times* of recent issue.

In regard to opportunities for British trade, the *Times* makes some statements which indicate a biased reasoning, but which are nevertheless of interest. The writer says:

"I am prepared to say that the present is an opportunity of a favorable nature. The basis of my reasoning is that in many colonies the American vehicles are ex-war machines and are rapidly approaching the end of the period of useful life. These motors will shortly be scrapped and replaced, and in view of the fact that in a number of countries they have not given entire satisfaction and of the preference which there is toward British productions owing to the better results obtainable in the long run, it would appear to be the moment for widespread propaganda and definite action on the part of our car and truck makers."

British manufacturers may be expected in the future to pay more attention to the need for plentiful power in export cars. An admission of the superiority of the American product in this respect appears in the following:

"A point which has hitherto not been sufficiently appreciated by our makers is that of horsepower. In many cases one of the main reasons for preference being given to American cars and trucks is the extra horsepower afforded."

Dawning recognition that the motor vehicle is not strictly a luxury but rather a general utility vehicle places the American product in a favorable position. The American manufacturer has stressed this idea and has, by reducing non-essentials, turned out a vehicle which ranks second to none. This factor is touched upon by the *Times*, which says to the British maker:

"Let him keep his chassis robust and save on the body. People overseas do not set much value on a pretty car; they want a utility vehicle which is not costly. A detail which should on no account be overlooked is that vehicles must be sold completely equipped. The Americans carry out this policy to a remarkable extent."

Spare Parts Crux of Problem

Regarding the problem of carrying spare parts, the *Times* says:

"It is, indeed, the crux of the matter, and is a problem not easily solved. The fact remains, however, that the difficulties must be overcome if the motor export trade to the Colonies is not to die out altogether. It is unreasonable and foolish to expect people to buy British cars and trucks unless they can get any spare parts which they may require within a few days. The American has worked out the whole problem and there is no reason why we should not be able to do so, though we start severely handicapped and at a disadvantage."

This statement while flattering appears in large measure to be a case of thinking the other fellow's pasture to be greenest. Hardly any American exporter would admit that we "had worked out the whole problem," for there remains an enormous amount of work to be done and the problem is far from simple.

Progressive Assembly Reduces Costs in Franklin Trim Shop

Tops are tailored on bodies after latter have been placed on chassis. Finish varnish coat applied before trimming. Orderly progress of work reduces to minimum chance of marring paint. Twenty-five bodies per day built with force of fifty-one men.

INSTALLATION of a conveyor line and progressive assembly methods in the Franklin open body trim shop has resulted in a decided improvement in quality with an attendant decrease in cost.

Quality has been improved generally because of specialized workmanship at each stage of assembly, and several new features have been developed by the installation.

Tops are now tailored on each individual body. Formerly they were built on a buck and transferred to the body just before assembly with the chassis. Some fitting and shifting was always required to obtain a smooth job without wrinkles.

Curtains, while trimmed and stitched before reaching the line, are punched and the eyelets are installed to fit smoothly on each body.

The electric wiring which radiates from the switch panel on the dash is all securely anchored in the bare body. This installation is now made under the most favorable conditions, formerly it was made on the final assembly line and involved an excessive amount of fishing and crawling over and under.

Standardization Brings Lower Costs

Lower labor costs are the initial result of standardized line production of any article. In this case, however, the resultant economy also includes several other considerations which are of importance not only in the trim shop but also in the paint department. Quicker stock turnover, less handling of materials and smaller floor space in both departments are primary benefits accruing from the progressive trimming line. For example:

No storage space is required between the paint and trim shops, as bodies are delivered from the final drying room directly to the trimming line.

The painting operation is now a continuous process involving only the time necessary for painting, varnishing and rubbing with the subsequent drying.

As only bare bodies are handled in the paint shop, there are no tops or windshield brackets that compel handling of the body in its normal position. Consequently, bodies are placed on end in drying ovens and rooms, four bodies now occupying the space formerly required for one in the final varnishing operations.

Final drying of the finish varnish coat takes place on the conveyor line, since the body is held in the paint shop for only 24 hours after leaving the dark room.

Emphasis must be placed on the fact that bodies are delivered to the trim shop after the finish varnish coat. No particularly difficult problem is involved in trimming a baked enamel body, as the finish has a porcelain-like harness immediately upon cooling. Finish varnish, however, remains slightly plastic or tacky for some time after application and the luster of the finish may be easily marred by finger prints or slight contact of the worker's clothing. This peculiar characteristic was the subject of much study by this company before the progressive line was adopted.

Delay Caused by Former Methods

Methods in use in the older type of trim shop were chiefly responsible for the delay which occurred between color varnishing and the assembly line. Formerly, bodies were trimmed after the first coat of color varnish had been applied, as the finish was subject to considerable marring in the trim shop. Since the job to be trimmed was pushed into any bay that happened to be open for the moment and then finished by a swarm of workmen, incidental marring was unavoidable. The trimmed bodies were then hauled back to the paint shop for final finishing. Because of the necessary return to the paint shop, tops were built on a buck and transferred to the body on the assembly line. Time required for the transfer with the incidental fitting was practically equal to that of the original building. Extra hauling and shifting also endangered the finish.

Progressive line assembly methods were then adopted. A definite location is assigned for each operation and one or two men can handle the work at that point without confusion, consequently marring of finished surfaces does not result. The assembly line is arranged so that the body is in the most convenient position for the different classes of work. Shields of binder board lined with waxed paper are placed on the bodies to protect points which may come in contact with the workman's hands or clothing. The binder board forms a hard, resistant surface, while the waxed paper lining does not affect the finished surface of the body in any way.

Schedule of Painting Operations

Bodies are received at the plant in the raw metal state, no primer of any kind having been applied. A brief schedule of the operations in the paint shop preliminary to delivery to the trimming line will indicate the type of finish produced. The operations follow:

1. Primer coat followed by 5 hr. oven drying.
2. Putty or smooth any surface irregularities.
3. Three coats of Selox Knifing Surfacer (Rough Stuff), each followed by 1¼ hr. oven drying.
4. First rubbing operation.
5. Ground color primer followed by 3 hr. oven drying.
6. Spray color varnish followed by 12 hr. in the air drying room.

1—First section of trim shop conveyor. This carries the body through seven operations. 2—Second section of conveyor. The next ten operations are performed on this line. 3—Showing a corner of the former Franklin trim shop. 4—Last section of conveyor where tops are built and curtains fitted

7. Rub.
8. Color varnish (rubbing), 12 hr. in air drying room.
9. Finish rub.
10. Inspect and touch up.
11. Finish varnish followed by 12 hr. in the dark room.
12. Storage in open drying room for 24 hrs.

The bodies are then delivered on skids to the foot of the trimming line. The skids are fitted with four casters, the gage of which fits the trim shop conveyor line track. Each body remains on its own skid from the final painting operation throughout the trimming line until delivery to the assembly line. All handling or moving is accomplished by the skid and the body is therefore protected from damage. An appreciable economy of floor space has resulted from the practice of handling only bare bodies in the paint shop. There are no windshield brackets or top bows to interfere with standing bodies on end, closely together in drying rooms and ovens. This feature alone has increased the capacity of the drying plant by 30 per cent. The time and effort which were formerly spent in protecting upholstery and trimming while rubbing and finish varnishing have been entirely eliminated.

Conveyor Divided in Three Sections

A brief description of the conveyor line will permit a clearer understanding of the conditions under which each operation is performed. The entire line is about 230 ft. in length and is divided into three sections. The gage of the tracks is about 5 ft., each rail being formed by a steel ship channel section with the flanges turned upward. Drive is accomplished by an endless chain located midway between the rails. Driving dogs are located on the chain and make contact with one side rail of the skids which carry the bodies. Movement is continuous at the rate of 27 ft. per hour. The driving dogs are spaced 9 ft. apart on the driving chain, thus establishing liberal clearance between adjacent bodies. The center line of the bodies is always at right angles to the line of the tracks.

Platform of Large Area

The first section of the track is about 80 ft. in length and extends along a well-lighted north wall. This section, upon which the body is carried through the seventh operation, is raised about 2 ft. from the regular floor level. A gravity curve transfers the skids to the second section of about 90 ft. length which lies along an east wall. The track throughout this section is about 8 in. above a platform which has been built over the regular floor. This platform is of very generous area and provides ample working space around the bodies and benches which are set against the wall.

A second gravity curve transfers the skids to the final section of the line 60 ft. long, which again lies along a north wall. The platform here is an extension of that for the second section, but the conveyor tracks are lowered so that the tops of these skids are flush with the floor. The space between the side rails of the skids is filled by planks which move with the driving chain. A continuous floor is thus made which facilitates working on the tops and curtains in a normal upright position. Operations 7-16 are performed on the second section and the balance, 17-20, on the final section.

Operations are arranged in natural sequence and are

timed so that with the exception of seat back and top assembly all the work at any station is completed in 20 min. Time allowance for two successive stations is made for these two operations. The sequence of operations with their corresponding stations is arranged as follows:

1. Inspect.
2. Place on conveyor, using an electric hoist.
3. Install instrument board.
4. Install incidental hardware, spark control bracket and scuff plates. Line up and counterbore holes for door handles.
5. Install electric wiring.
6. Trim doors, interior of cowl and kick pad.
7. Assemble door handles, curtain fasteners and robe rail.
8. Assemble seat springs and side arms.
9. Fill and tack up side arms, front and rear.
10-11. Hang seat backs and finish off side arms.
12. Trim edges of upholstery ready for binding. Line seats with enamelled duck.
13. Bind upholstery.
14. Assemble windshield.
15. Install cushion retainers, door checks and foot rest.
16. Install top irons and top bows.
17-18. Build tops.
19. Fit curtains.
20. Inspect.
21. Correct any defects found in inspection.

Sub-assemblies for Each Station

Material which is to be installed or assembled at a station is delivered at an adjacent point. Sub-assemblies for each station are prepared at the adjacent portion of the bench, in most cases by the men who are assigned to that particular assembly operation. In this class may be included: assembly of various units on the instrument board, grouping of cushion springs, assembly of top bows on a buck, installation of window in rear panel of the top and various similar operations. Tops are built and fitted directly to each body as a regular routine part of the work of that part of the line. Eyelets are located in each curtain to fit the location of the snap fasteners on the individual body and top.

An electric hoist places the body in this conveyor by means of slings that pass under the skids upon which the body is carried. As the entire length of the line including transfer curves is in excess of 250 ft. and the rate of travel is approximately 27 ft. per hr., every body remains on the line for more than one working day. The over-night time which is involved brings the total time in the trim shop up to about 24 hr. A final 24 hr. storage in the paint shop serves to harden the finish to a degree that permits mounting on the chassis with small possibility of trouble from tacky varnish.

Capacity for 25 Bodies Per Day

The line as described has a maximum capacity of 25 bodies per day with a working force of 51 men. A decided reduction of labor costs has been coupled with a decrease of at least 50 hr. in total time through paint and trim shops. In addition to these gains, the amount of floor space required in both departments has been materially reduced. Finally, marked improvement in quality of both finish and trimmings has been shown.

Bodies with a high varnish finish are in many plants mounted on the chassis after road testing, although some manufacturers return the entire car to the paint shop for final varnishing after the road work. In the latter case a considerable amount of cleaning and washing is necessary before the body is again in suitable condition for varnishing. In either case the work of the paint shop is complicated by an undue amount of handling coupled with the relatively greater floor space which is required. At the Franklin plant bodies are taken from operation 21 of the trimming line and immediately mounted on the chassis. A small storage space is provided to permit selection of body color to match the chassis. This assembly then passes over the remainder of the assembly conveyor, where fenders, lamps, etc., are installed.

Special testing provisions are necessary in conjunction with this routine. Road testing is almost entirely eliminated. Engines are given a brief idling run-in after assembly and then a thorough dynamometer test during which carbureter and electrical units are adjusted. Power is transmitted from the engine to the dynamometer through the regular clutch which is installed at the end of the engine assembly line. A thorough test of the clutch is therefore included. Tappet clearances are adjusted and attention is given to every detail which makes for quiet engine performance. Each gear box is adjusted and receives a regular run-in in a silent room after assembly. Rear axles are handled in like manner.

Traction Test Follows Assembly

The completed car is delivered to a traction dynamomter room directly from the end of the assembly line. The equipment of this room consists of seven electric dynamometers which are connected to drums, their upper edges being raised slightly above the floor level. Six of the dynamometers are of the direct electric reading type. The seventh is equipped with a scale balance and is in charge of the engineering department.

Each car receives an adequate run-in under both full load and level road condition at various points in the speed range, the carbureter being set at the position for best all around performance. External inspection of the crankcase, gearbox and rear axle is made constantly for undue heat or vibration. The friction load of the entire power plant is checked at all speeds against a standard curve. After the car has satisfied the requirements of the dynamometer test, a brief run of about 20 miles is made on the road, chiefly for the purpose of locating and eliminating any slight squeaks or noises which may develop.

Motor Rail Equipment Grows

IN recognition of the increased demand for motorized rail equipment, a special committee of the American Railway Association has undertaken an inquiry into this field. A questionnaire has been sent out to the various member lines asking for a report on their experiences with motor propelled rail cars and data as to the possibilities of their use in the future, as a means of economizing in operating costs.

In an interview with AUTOMOTIVE INDUSTRIES recently, R. H. Aishton, president of the American Railway Association, stated that the carriers were now giving more attention to this subject. Though not acquainted with the budgetary details of the various railroads, Aishton expressed the opinion that the total authorized expenditures for equipment and other facilities of approximately $1,100,000,000 for the year 1923, contained appropriations for motorized equipment.

The exact amount appropriated for motor transport will not be known until the questionnaires are returned to the special committee here. The American Railway Association authorized this expenditure at a meeting held April 5. Of this total $160,000,000 will be spent for locomotives; $515,000,000 for cars and $425,000,000 for trackage and other facilities. Last year the total expenditures of the railroads for equipment amounted to $440,000,000.

Higher Sugar Prices Open Up Cuban Automotive Market

Country steadily pulling out of depression brought on by panic of 1920. Crop conditions portend great need for motor vehicle transportation. Sales success depends on good distribution and financing. Heavy trucks still overstocked.

By George E. Quisenberry

WITH this article, AUTOMOTIVE INDUSTRIES begins a detailed study of the automotive outlook in Cuba. Being the nearest of our overseas markets, this island is always among the first of the territories to attract attention of manufacturers entering the export field.

Conditions there are analogous to those in other foreign countries in many respects, and the export official who has a clear understanding of the trade as it is developing in Cuba, has a foundation upon which he can base his considerations of other markets, particularly in the Spanish and Portuguese territories.

THE automotive industry of Cuba is making a gallant comeback. On the wave of higher sugar prices it is winning its way once more to a commanding position. In the months to come, we shall hear much of automotive transportation in this little republic, which is only now experiencing returning prosperity.

Three years ago the bubble burst in the Cuban "dance of the millions," as the business men of Havana call the hectic days of 1919 and 1920. The boom collapsed almost overnight and Cuba was plunged into a commercial and financial crisis which had no counterpart for severity in this country. With sugar constituting all the eggs in the basket, and with the value of that crop cut to scarcely one-tenth of its peak, business and trade went as flat as a punctured tire.

Perhaps the Cubans themselves were to blame, and perhaps it was the American banks who were plunging so heavily as the prospective millions danced before them. But no matter what the cause a moratorium was hastily declared and Cuba was left to pick up the pieces and put them together again as best she might.

The mending was not easy. Two sugar crops came along, each with ruinous prices, although one of them was of record size. The planters carried on, their debts mostly unpaid and, often enough, with no more financing than the credit which they could obtain from nearby sugar centrals and merchants.

For two years this condition held; then, a few months ago, the world awoke to a realization that the sugar crop for 1922-23 was short a few hundred thousand tons because these same planters had been unable to buy needed fertilizer and to pay the labor for cultivation. Aggravated by a lack of rainfall in certain important producing sections, and by a later shortage of labor when the time came for cutting the cane, the sugar scarcity became pronounced and prices rose to their present levels. Cuban and American business men of the island believe that manipulation has had little effect on sugar prices, that the present crop is somewhat short, and that the prices of today are a simple working out of the law of supply and demand.

As goes sugar, so goes Cuba. The planters who had hung on and the business men who had retained their faith in the future began to see business take the upgrade. This upward tendency first appeared late in 1922, but the curve has risen sharply and those who know Cuba best predict that the island has before it a long period of prosperity and will need many automobiles.

It is eminently worthwhile to examine into automotive conditions in Cuba as they are and as they promise to be in the months to come. The basis for the analysis is a recent trip to Havana, during which the writer met many automotive dealers and distributors of the metropolis, following a long range acquaintance with the industry extending over several years.

Havana a Motoring City

The automotive visitor to Havana is impressed first by the apparently large number of passenger cars and trucks which he sees between the steamer landing and arrival at his hotel. Literally, the automobiles swarm around him wherever he goes, on both the narrow and picturesque streets of the business section and the wider boulevards. Ford cars, "dolled up" to such an extent that they don't look natural, are so numerous that he will marvel. Fords make up only a part of the automotive traffic. Models of nearly every make manufactured in the States, from the lowest in price to the highest, are in use, both passenger cars and trucks. They carry much of the commerce of the city and often block traffic.

Havana is a city of contrasts. It is so in the automotive industry and in every other line of commerce and trade. The Parque Central, from which the city streets radiate and which is the focal point for visitors and tourists, has on one side a long line of "jitneys" awaiting fares. Fords predominate, but there are many Chevrolets, Stars (known in Cuba as the Estrella), Dodges, Maxwells, Buicks, Oaklands and others, with a sprinkling of new Studebakers. These jitneys, or "fotingos," as they are known, will carry one passenger anywhere within the first zone of the city for one peseta

(or twenty cents) and the charge is seldom more than fifty or sixty cents for any trip in Havana.

On the other side of the park, just as numerous, are the cars "de lujo," often with drivers in livery, also awaiting passengers. These are higher-priced automobiles—Packards, Cadillacs, Cunninghams, Mercers, Coles, Haynes, Hudsons, Pierce-Arrows, Willys-Knights, Paiges, and others. Their spick-and-span appearance would seem to stamp them the private cars of wealthy owners. But they also are for hire at reasonable rates, if the visitor knows sufficient Spanish to obtain the native rather than the foreign rate.

In the difference between the two sides of the square is much that must be understood to visualize the automotive industry and, indeed, all the business of Havana and Cuba. Conditions vary materially and general statements can seldom be made with any expectation that they will apply to more than a limited number of individual cases. Trade is either good or bad. It is seldom "half way in the middle" and, as Cuba is a one-crop country, the change may come within a comparatively short period.

Efficient Dealers Winning

Just now business is exceedingly good for the better established companies which merchandise their lines with care and back them up with efficient service. For these houses, and for the others which will follow in their footsteps, sales will continue to be good, with seasonal variations, as long as there is any market for sugar. But for the less efficient and energetic companies, there are even today but few sales and, unless something of the "dance of the millions" returns next fall, their business will be strictly limited.

The problem, so far as the manufacturer is concerned, is to obtain good distribution and to place his lines with well founded, well backed and energetic companies. Then, if his line is properly made and priced and if his policies are built on common sense, a good business is assured.

The necessity for careful distribution is everywhere apparent and it is doubly certain that no line can prosper long and keep in the running if it is not handled on the spot with care and intelligence. There are orphan cars galore in Havana, there are lines severely handicapped by past reputations, and there are good lines which are scarcely known in the Havana market. The fault in nearly every instance has been one of distribution and local service.

Bulk of Business in Few Hands

Some five or six local companies, representing no more than ten passenger car lines, are today doing the great bulk of the business. Certain of these firms sold a substantial volume of cars right through the depression period. Others began to "get out of the red" last December and January and expect to continue on the right side of the ledger for at least many months to come. Their merchandising and service facilities are so excellent that this optimism seems fully warranted.

The chief problems now before the automotive industry in Cuba may be summed up as being those of merchandising, service and financing. The distributors and dealers admit these without reservation. In fact, they are extremely keen to know more about better methods of salesmanship and of service.

In some cases, the same methods which are in use on Broadway and the motor rows of American cities are in use, modified of course to meet local conditions. Competition has forced this condition and the use of such plans is bringing good business. Service and maintenance are likewise of growing importance and, without doubt, there has been a vast improvement in this respect within recent months. Some distributors have worked out careful inspection systems, with service guarantees for certain periods after the car is purchased and with emergency service whenever the need arises.

Capital and Credit Essential

On the financial side of the business, it is perhaps unnecessary to say that those houses now obtaining the bulk of the business are amply backed by capital and credit. With the exception of Ford jitneys, cars are being sold generally on deferred payments, which, in some cases, the dealers must handle themselves. Some companies, but not many, are receiving from sixty to ninety day terms on their importations, but they resell on much longer payments. The banks are less hostile than formerly, but they grant credits infrequently and dealers do not have the recourse to them that general conditions warrant. Specialized finance companies are almost unknown, although the opinion is expressed that there is a fertile field for them.

There probably are twenty to twenty-five companies in Havana handling car and truck lines. Some of them make very few sales but others have a large monthly volume. In addition, five or six firms may be classed as equipment and accessory jobbers, none of which is exclusively wholesale. Retail departments are maintained by all. The number of garages, each with a small stock of equipment and tires and limited service facilities, is large in Havana, some estimates placing it as high as 600, but with the actual number being probably closer to 300 or 400. A few of these places buy direct from the States, either from factories or jobbers, but the majority purchase their equipment in Havana, on terms varying from cash to what in some instances may be practically a consignment basis. A recent count showed more than thirty brands of tires handled in Cuba, but no more than a quarter or a third of these are being actively pushed. In addition, there are numerous service, electric, body building, painting and other automotive establishments.

New Agencies Placed

A few new car agencies have been placed within the last six months, but not many. Studebaker is the most important of the older makes of cars newly placed in Havana, but Durant and Star obtained an excellent connection only a short time ago. In passing, it may be noted that the Star name cannot be used in Havana, as it is under an old registry to a British firm. The car, therefore, is being sold as the "Estrella," which is the Spanish equivalent of Star. The company behind it has been very active and the Durant organization considers Havana a domestic rather than a foreign market.

New dealer establishments probably will be opened before the end of the year, as financial conditions are such as to insure a marked increase in car sales. Outside capital may be expected to enter the industry and already a number of firms are planning enlarged service facilities and are opening new or enlarged salesrooms. Despite the high plane to which some distributors and dealers have carried automotive sales and service, only a few really good salesrooms are to be found in Havana. This is admitted by the dealers themselves, who say that they have been too involved financially during past years to extend their establishments in any way.

Some signs already are to be seen, however, that salesroom improvements are under way. One new firm has opened quarters on the Prado, another is building a large extension to its present place on that avenue, a third is seeking quarters there and a fourth, located on the Marina, will soon commence construction of an addition that will give both a salesroom and service station of large size and fine facilities. Another company, handling two well-known car lines, expects either to move into a new building or reconstruct its present quarters.

Leaving Havana and taking up the interior sections, an important recovery has been made in sales and a number of new establishments have been opened within the past few months. One of the larger distributors in Havana reports that about one-third of its present business in new cars comes from outside the capital. This company, handling several good American cars, has recently established branches at Santiago and Cienfuegos and has nearly forty dealer and sub-dealer connections in other places. Ford expects about 40 per cent of its business to come from outside of Havana and present sales are approaching that percentage.

Rural Sales Growing

The four distributing companies which have been most active outside of Havana report a combined total of more than 100 agencies, many of which are now actively selling the low and medium-priced lines and, in a few instances, higher priced makes. These agencies are in thirty-five or forty centers and other places have yet to be opened on agency or sub-agency arrangements. Two companies have about thirty-five agents each, a third about twenty and the fourth about ten.

Rural sales are, of course, dependent largely upon crop and road conditions. Sugar and tobacco planters, as well as cattle farmers, merchants in the cities, and professional and business men, in general, are finding the automobile essential to transportation and are buying accordingly. Too much emphasis cannot be placed upon the importance and the growing character of rural markets.

A certain large distributor in Havana was without any representation whatsoever in the interior as recently as eight months ago. At that time an intensive effort was made to build up this part of the business but without immediate results. Changed conditions came with the new sugar crop and since January nearly ten connections have been made, several of which have opened new establishments and are making frequent sales of the medium-priced car which the company handles. This is a typical illustration and may be taken as a straw showing in which way the wind of business is blowing in Cuba. The upswing is gradual but it is none the less positive.

Agencies Grouped in Motor Center

The Prado, the Malecon and the Marina (the latter an extension of the Malecon) are the motor centers of Havana. On one or the other of these boulevards are located nearly all the principal car agencies. Within a comparatively few blocks are to be found Dodge, Ford, Lincoln, Paige, Jewett, Durant, Star, Packard, Chandler, Cleveland, Kissel, Columbia, Richelieu, Singer, Revere, Cunningham, Hudson, Essex, Buick, Cadillac, Stutz, Willys Knight, Overland, Locomobile, Mercer and others. Only Studebaker, Chevrolet and Marmon, of the important American lines, are exhibited elsewhere and the new Studebaker connection is seeking quarters on the Prado. Chevrolet and Marmon are displayed in the lobby of the Teatro Nacional, which faces the Parque Central at the upper end of the Prado.

Within a few blocks of the Prado and the Malecon may be found numerous other establishments having to do with automobiles. Several of the tire distributors are just off the Prado and on San Lazaro, which runs at an angle from the meeting of the Malecon and the Prado, are located equipment, service and tire companies, such as the representatives of Fisk, Exide, Willard, the Cia. de Accesorios, etc.

Cuba already has been well sold on motor trucks, but the unfortunate factor is that this selling was done too well before the boom collapsed. Particularly is this true of the larger sizes, hundreds of which are yet held in stock by dealers and distributors. Estimates place the number of these vehicles as approximating 500 or 600, representing practically all of the better known and some of the lesser known lines.

Trucks were dumped in great numbers upon Havana shortly before the moratorium was decreed and the efforts to dispose of these vehicles have not yet been successful. The stocks have been reduced somewhat in recent months but little demand exists at present for any sizes above 1½ or 2 tons in capacity.

Here, again, general statements are inadequate, as all phases of the truck business are not so black as this would indicate. One company has recently made a satisfactory campaign on 1-ton trucks, which it sells complete with delivery bodies made in its shops in Havana. The bodies are well built, of non-rusting sheet steel, attractively finished, and the company is achieving an undoubted success with this policy. The conclusion drawn from this campaign, as well as from the general business and commercial outlook, is that the smaller truck sizes can be sold in Havana and other sections of Cuba if an attempt is made to develop business. As the present prosperity develops and as public and private improvements become more extensive, the truck markets will widen and the unsold stocks will disappear. This will not eventuate overnight but, whenever it does, truck makers should exercise more judgment in making sales to Cuba. Road and street conditions in Havana and outside of it do not justify the larger trucks, except in isolated instances, and, consequently, the smaller models should be used throughout the island. A large development may confidently be expected.

Controlling Business Finance

THE financial problems of a business as a coordinated whole are well presented by James O. McKinsey and Stuart P. Meech in "Controlling the Finances of a Business," recently published by the Ronald Press. This volume is written with the idea of assisting in the application of scientific management to financial planning and control and should prove valuable to business executives.

Much has been written concerning the business cycle and its effect on financing, manufacturing and merchandising programs. Too often the material is presented in a manner to confuse rather than to aid and enlighten the reader. The authors of this work, we think, not only have escaped this dilemma but have done an excellent piece of work.

Many students of the business cycle tend to regard the phenomenon in its narrowest phases and their writings reflect it. McKinsey and Meech have steered a middle of the road course, laying neither too much nor too little emphasis upon it. They have shown the relation of the cycle to a business as a whole, to the securing of fixed and working capital and have left abstractions to others.

New Excelsior Engine Is Fitted with Overhead Camshaft

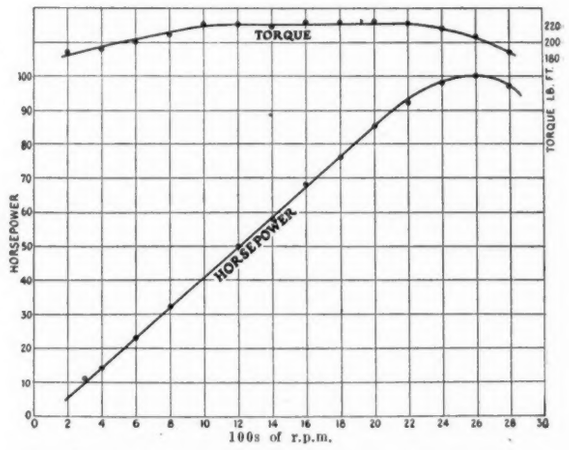
This unit is driven by spiral bevel gears. Valves are fitted with piston shaped guides which take side thrust of cams acting direct on end of valves. Camshaft brake, interconnected with throttle, is arranged to minimize gear noise when engine idles.

OVERHEAD valves carrying on their upper ends piston shaped guides which bear directly against cams without interposed rocker arms are the outstanding feature of the new four-cylinder engine recently placed on the market by the Excelsior Motor Mfg. & Supply Co. The overhead camshaft is driven by spiral bevel gears from a vertical shaft in front of the engine. The fan and cross shaft for driving pump and magneto are also driven off the vertical shaft.

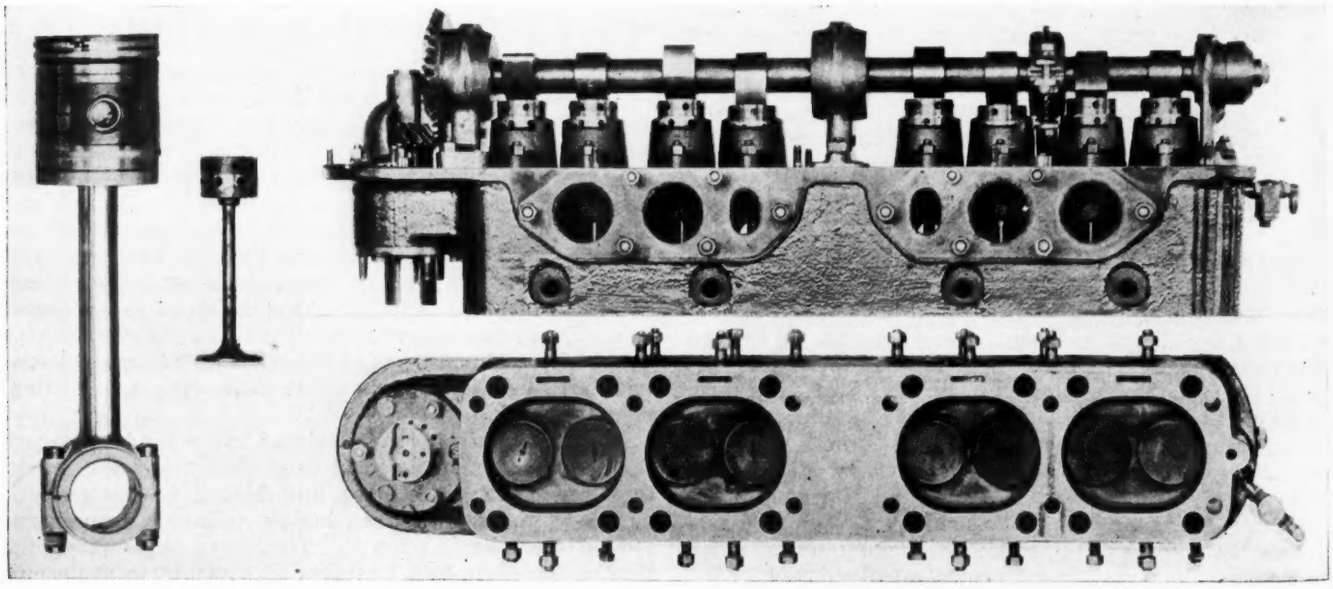
Other features include a camshaft brake and a pressure lubricating system which delivers oil to all bearings including those on the piston pins. The aim of the designers was to combine light weight with high economy and durability.

While the engine incorporates some rather unusual features which represent a considerable departure from conventional construction, all of these practices have been tried and found satisfactory in other makes of engines and only their application in this engine is modified or simplified.

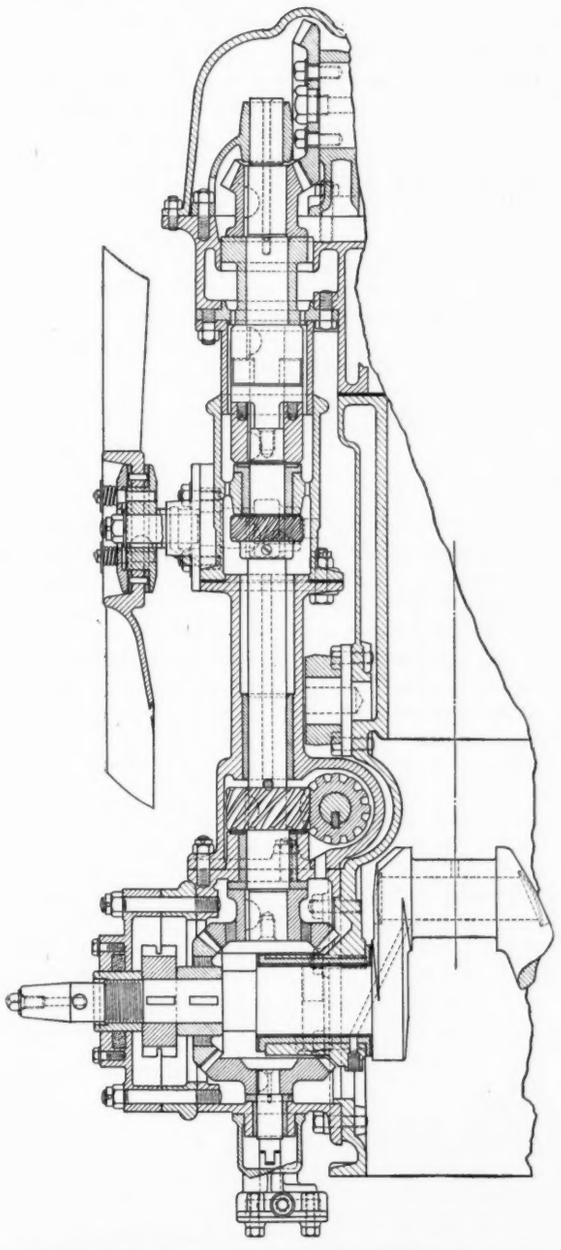
The engine has 4 in. bore and 6 in. stroke giving a piston displacement of 301.6 cu. in. The compression ratio is 4.75 to 1 and the engine weight without generator and starter is 700 lb. On the dynamometer this engine, equipped with steel connecting rods and alloy pistons of the split skirt type, is said to have developed 1 hp. per 3 cu. in. piston displacement. The power-speed curve peaks at 2600 r.p.m. at which speed the engine develops 100 b. hp. The engine as supplied for trucks and buses is regularly fitted with medium weight cast iron pistons and tubular steel rods, and is intended for speeds up to 2000 r.p.m., developing 80 hp. Up to 1500 r.p.m. there is said to be no perceptible difference in power output as between



Power and torque-speed curves of Excelsior engine fitted with alloy pistons, as plotted from data furnished by manufacturers



Head, piston, rod and valve used in new Excelsior engine. Note mounting of camshaft brake which helps to minimize gear noise



Section through vertical shaft which drives camshaft and cross shaft. The bevel gears employed are of the spiral type

cast iron and aluminum alloy pistons. With cast iron pistons there is some falling off in power between 1500 and 2000 r.p.m.; the difference is said to be 5 hp. at 2000 r.p.m. Alloy pistons and rods are furnished as special equipment at moderate increase in price.

The overhead camshaft and valve operating mechanism probably represent the greatest departure from conventional practice. As will be noticed from the sectional view of the cylinder head, the valves are actuated directly by the cams, there being no interposed rocker arms. A piston shaped valve guide into which the valve stem is screwed takes the side thrust of the cam and is said to relieve the valve stem of all side strain. A hardened steel disk also screwed on the valve stem on top of the guide answers the dual purpose of a lock nut and mushroom cam follower. Both the lock nut and trunk pistons are provided with small holes drilled in the periphery for the insertion of pins by means of which a fine adjustment can be secured for the clearance between cams and mushroom. This construction is somewhat similar to that employed in the Hispano-Suiza aviation engine.

The valves are of large diameter. The port measures 2 3/16 in. in diameter and has an area of 3.608 sq. in. The gas passages are free and direct in order to insure high volumetric efficiency. The intake manifold is exhaust jacketed and a patented feature is said to give surging of the gases through this jacket.

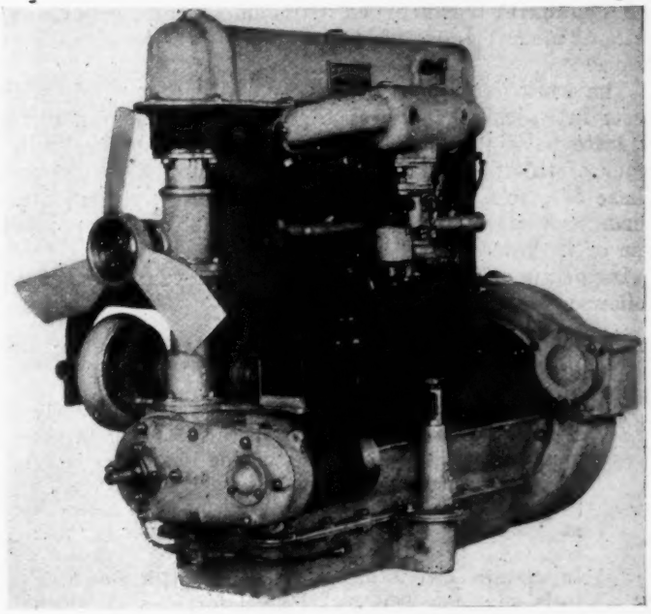
One of the unusual features is the use of a camshaft brake to steady the camshaft at low and idling speeds. This brake is said to effectively overcome any tendency for noise which might otherwise be developed in the gears of the vertical shaft and camshaft. This brake consists of a band operating with a spring pressure of about 20 lb. on a small drum. The band is connected by suitable means to the throttle in such a way as to be brought into play at low and idling speeds.

Patented Oil Retarder Employed

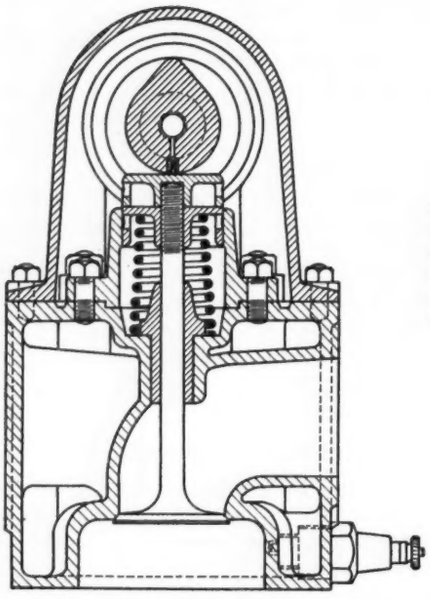
The camshaft is hollow and is kept supplied with oil by a lead coming up on the outside of the engine at the flywheel end. The surplus oil from the camshaft is returned to the sump through a casing surrounding the vertical driveshaft and gears, thus lubricating the gears and the shaft bearings. A patented oil retarder located in the camshaft allows an ample supply of oil to pass to the mushrooms and valve guides but is said to prevent excessive lubrication of these parts. Trouble due to excessive oil passing along the intake valve stems and into the combustion chamber is thus avoided. The camshaft is driven by two sets of spiral gears with suitable means for taking up wear in the gears.

The water pump, magneto, generator and fan are driven off horizontal shafts which in turn are driven by the vertical shaft which also drives the camshaft. The housings for the vertical shaft are of aluminum.

Just ahead of the bevel gear on the crankshaft is mounted a sprocket for the generator drive chain. This chain is enclosed in an aluminum housing. The generator ordinarily is flange mounted just below the magneto bracket. A small plate on the front of the generator drive chain case facilitates removal of the generator without having to take off the entire cover of the case. As will be noted from the sectional view of the front drive assembly, the cooling fan is driven by spiral gears direct from the



New 4 x 6 in. four-cylinder Excelsior engine with overhead camshaft



Sectional view of head showing arrangement of valve bearing directly on guide attached to upper end of valve

vertical shaft. A simple clutch automatically releases the fan drive so it will not run above a speed of 1500 r.p.m., at which the fan furnishes its maximum supply of air. The oil pump is driven by a bevel gear and vertical shaft in line with the shaft which drives the camshaft. This pump is accessible and easily removed.

One of the features in connection with the crankshaft which is of the three-bearing type is the liberal dimensions of the center and rear main bearings, which are 2¼ in. in diameter by 4 in. long. The front main bearing is 3½ in. long by 2 in. in diameter. The crankshaft is forged from 3½ per cent nickel and .035-.045 carbon steel. The crankshaft carries the usual flange at the rear end for attaching the flywheel, the latter being of semi-steel with gear teeth cut in the rim for starting motor pinion engagement. All bearing and crank pins are hollow and the throws of the crankshaft are drilled to convey oil from the main bearings to the crank pins.

The connecting rods are of the tubular type forged from 3.5 per cent nickel and .035-.045 carbon steel heat treated. They are light and an oil tube passes from the lower to the piston pin bearings lubricating the latter under pressure. The cast iron pistons are as light as consistent for the service required.

The cylinder block is of gray iron, as is also the cylinder head. The crankcase is aluminum with a sheet steel pan. One of the features in connection with this pan is the fact that the oil gage stand is integral with the pan, which minimizes the chance of injuring the float mechanism should it become necessary to remove the pan. The oil strainer consists of a cylindrical screen which can be removed very readily from the outside of the pan. Oil pressure is regulated so that it varies from 5 lb. per sq. in. when idling to 75 lb. at maximum speed.

Engine Has Three-Point Suspension

Ordinarily the engine would be considered to have four-point suspension, but inasmuch as the front engine support is itself pivoted in the center, the mounting is essentially a three-point type.

The front engine support is forked on the left side of the engine in order that the magneto may be readily slipped into and out of place. All flanges and brackets are made to S. A. E. standard dimensions so that any starting motor, generator and ignition equipment may be used.

Driving the water pump and ignition unit off a cross shaft makes these units readily accessible for inspection or replacement. Incidentally, this construction is said to add smoothness to the accessory drive, inasmuch as the water pump acts as a cushioning device.

The starter motor can be placed on either side of the engine and flanges are provided for this purpose. Engine parts are made interchangeable without special fitting and all materials are in accordance with S. A. E. specifications.

Breakdown Tests Unsatisfactory as Basis for Buying Tool Steels

TECHNOLOGIC Paper No. 228 of the Bureau of Standards is concerned with comparisons of performance of modern high-speed tool steels in "lathe breakdown tests."

The work described in this report dealt not only with tests in which the endurance of tools is measured under definite working conditions, but likewise with the limitations of this method of testing when applied to the purchase of steel. The modern steels are first classified according to chemical composition, and this division is made use of in discussing the results obtained.

Important features developed may be summarized as follows:

(1) Breakdown tests are not satisfactory as the basis of purchase for tool steels.

(2) While competitive comparisons of brands of nearly similar performance are not justified, owing to the qualitative nature of this type of test, relatively large differences may be ascertained with certainty, provided sufficient tools are tested and averages of at least two grinds are used in interpreting the results.

(3) In certain severe breakdown tests with roughing tools on 3 per cent nickel steel forgings in which high frictional temperatures were developed, it was found that the performance of commercial low tungsten-high vanadium and cobalt steels was superior to that of the high tungsten-low vanadium type, as well as special steels containing about ¼ per cent uranium or ¾ per cent molybdenum. The average power consumption in all cases was practically the same so that this factor need not be introduced in comparisons which may be made on the basis of the endurance of the tools.

(4) Modification of test conditions, including small changes in tool angles but principally changes in the cutting speed more markedly affected the performance of steels containing cobalt or special elements, such as uranium or molybdenum, than the basic types, such as plain chromium-tungsten-vanadium steels.

(5) The relatively poor endurance of high tungsten steels under severe working conditions was not observed in more moderate tests which were made on the same test log with equal cutting speed and depth of cut, but with reduced speed and in which the frictional temperatures produced were not so high. Also, in these latter tests the performance of the cobalt steels was better than either the low or high-tungsten steels.

(6) Hardness determinations and examination of fractures indicate that the various types of commercial high speed steel show differences in behavior under heat treatment and in physical properties which probably are of importance under moderate working conditions and might counterbalance slight advantages in performance.

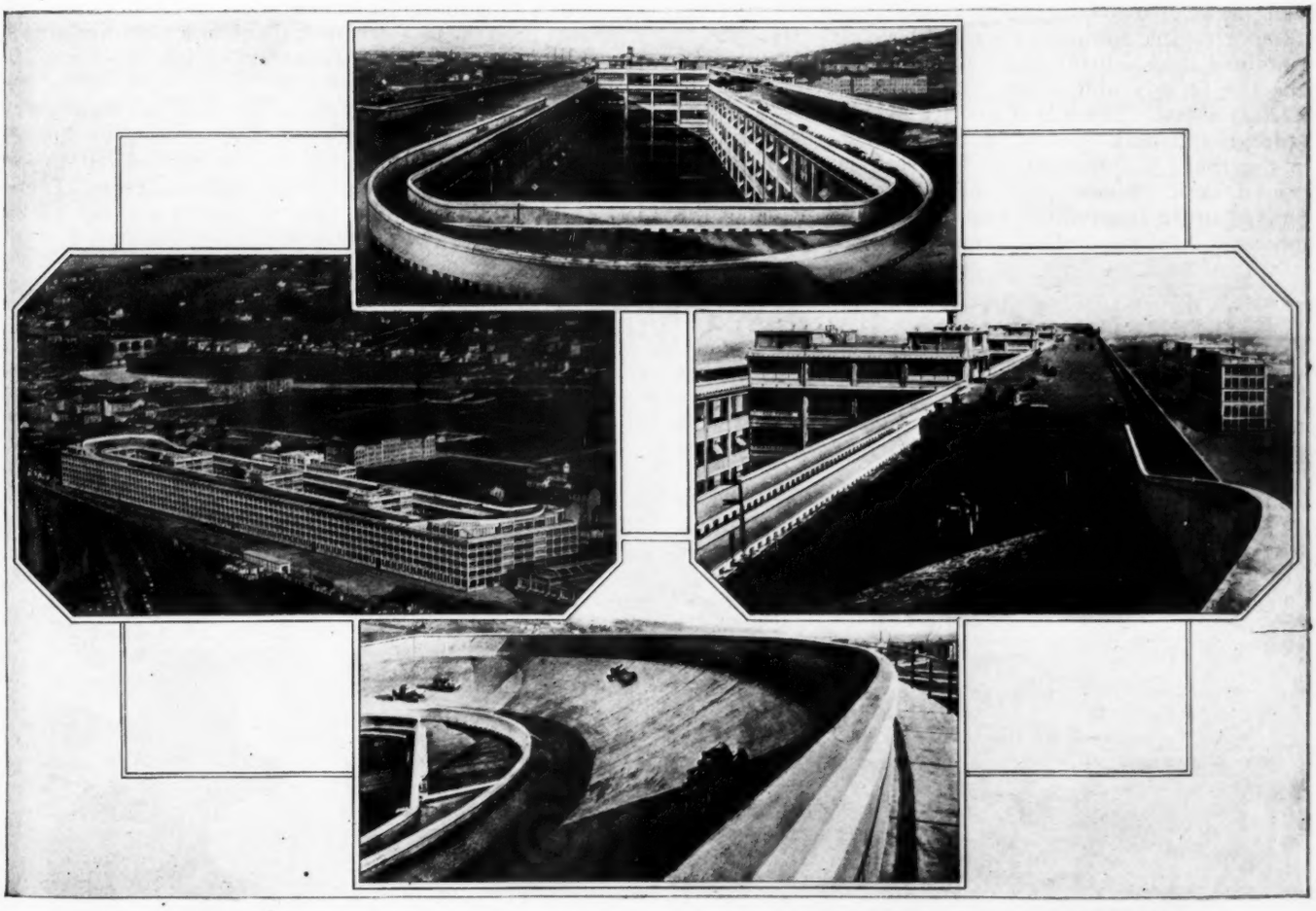
Fiat Factory Roof Track Cuts Chassis Testing Costs 60 Per Cent

Proves complete success after two months' operation. Concrete construction with asphalt top dressing. Curve banking 20 ft. in height surmounted by 10 ft. wall. Speeds of 70 m.p.h. made possible on straightaway. Machine made ready on crossways.

A SAVING of 60 per cent in cost of chassis testing has been made possible by the use of the aerial speedway on the roof of the Fiat factory in Italy. When the designs of the new factory at Lingotto, in the suburbs of Turin, were laid out, it was decided to use the roof of the five-story building as a track on which chassis could be tested at speeds up to 70 miles an hour. This track, which has been in full operation for two months, has proved a complete success from the standpoint of economy and efficiency and has put Fiat in the favorable situation of being the only firm in Europe independent of public highways for chassis testing.

As a precaution, every tenth chassis is still sent into the hills around Turin, at the hands of specially skilled testers, in order to ascertain if there are any defects which the track fails to reveal. It is probable, however, that these short road tests will be entirely eliminated in favor of the roof track tests. The roads will, therefore, only be used to try out new models before they go into production.

The roof track, which consists of two parallel straightaways 27 ft. in width, united by four banked turns, measures 1160 yd. around on the center line. Construction is armored concrete throughout, with asphalt as a top dressing and asphalt bricks for the banked portions.



Testing track on roof of Fiat factory at Turin. Thestraightaways and banked turns measure 1160 yd. around on the center line. A high wall at top of bank acts as a guard. Two parallel walls on the inside of the curves hold cars which might slide down the bank and serve to make a zone for foot passengers

To assure safety there is a heavy concrete wall 5 ft. in height on each side of the straightaway stretches and on the inside of the curves. The banking, which is 20 ft. in height, is surmounted by a 10-ft. concrete wall on the outside. There is a double wall on the inside of the bends, the zone between the two being used by foot passengers. This construction gives additional security, for even if a car rolled down the track it could not drop to the ground unless it went through both walls.

Although considerable snow falls in Turin, the design of the track makes it possible to test cars every day in the year. The straightaways are slightly cambered, to allow rain to run off into the gutters, and hot-water heating pipes carried in the ceiling of the shops radiate sufficient heat through the floor of the track to melt snow as it falls.

Shops Placed Under Banking

Advantage is taken of the very high banking to install shops under them for mechanical adjustments to cars under test. These shops are reached by a passageway at the end of the straightaway, the car going in at one end of the turn and coming out at the other without interfering with others going by at speed.

The two main blocks of buildings are linked up by three transverse buildings, which give a ground plan of four courts. These buildings, which give transverse connection between each of the five floors of the factory, carry the staircases and seventeen electric elevators. On the track they form covered bridges between the two straightaway stretches, into which the chassis are discharged from the elevators, and are made use of to prepare the vehicles for their tests and for working on them between trials.

Labor saving appliances are used widely. Gasoline is contained in a central fireproof underground tank outside the factory and is pumped up to gravity tanks in the test shops. There is a gravity overflow back to the underground tank, so that no fuel is kept permanently on the roof. Lubricating oil is also kept in an underground tank. Steam pipes pass through it and it is pumped up to the roof as required. In addition to the hot-water heating system there are electrically-heated water tanks for radiator use only.

As the chassis come up without storage batteries, electric current is stepped down to 12 volts for use in starting the cars. Compressed air is available for tire inflation and electric cranes are provided for lifting loaded test bodies on the chassis.

Every individual test must be reported on in writing to the foreman of the department. No driver can make two consecutive tests of the same chassis. If any defect of more than a minor character is discovered, the chassis must be sent back to the assembly shop with a report for the department responsible for the defective unit. Minor adjustments are made by the track mechanics, and this work includes the changing of timing gear wheels if the degree of silence is not considered satisfactory.

A sound-proof shop under the banking is used for this work.

Independent of the chassis tests, every completed car is sent to the track for a final examination and a run under its own power. Several laps are covered in order to see that the mechanical units have not suffered in any way during the body building process. Electric lighting and starting units are tested; examination is made for gas, oil, grease or water leaks, and the car is then gone over by a body inspector for any possible body defects or for missing accessories. When passed as perfect, the gas tank is pumped dry, radiator emptied, and oil filters taken out, cleaned, and replaced.

Running tests on the roof track do not replace the component tests in the factory. Every engine is run under power and every gearbox and rear axle is run in before these units go to the assembly line. The engine test shop, which is on the ground floor, has all the exhausts brought to a central collector, which discharges into a chimney 10 ft. in diameter having its outlet at one extremity of the roof track.

The Fiat roof track enables a smaller and more carefully selected staff to be used, and it assures higher efficiency by enabling the tests to be carried out under the direct control of foremen and staff engineers. There is the further advantage that no insurance has to be carried against third party risks.

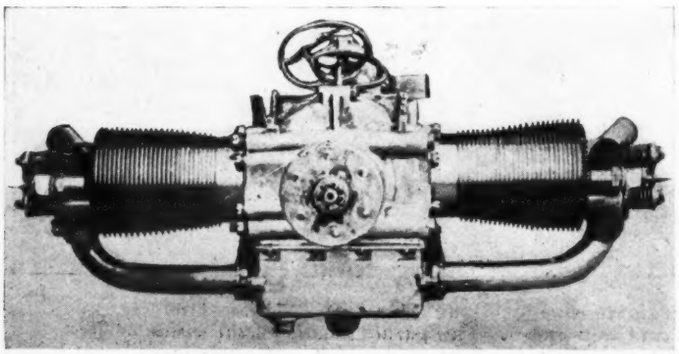
Frenchman Flies English Channel on One Gallon of Fuel

A RECORD for inexpensive flight has been made by a Frenchman, Georges Barbot, who recently made a double crossing of the English Channel and followed it up with a flight from Boulogne to Paris on which trip the plane consumed 5.2 gal. of fuel.

Barbot's machine is a Dewoitine monoplane glider having an area of 193 sq. ft., wing spread 43 ft. 6 in., length 20 ft., height 47 in., weight empty 242 lb. and weight with pilot and equipment 507 lb.

The engine is a twin cylinder, 15 hp. air-cooled Clerget. It was not designed specially, but was fitted for the flight in view of the contest ruling calling for all parts of the machine to be of French construction.

The two cylinders, which measure 3.3 by 3.9-in. bore and stroke, are steel forgings with fins and are mounted on an aluminum crankcase. Valves are placed in the head with push rod operation. Ball bearings are used for the crankshaft and roller bearings for the connecting rods. The propeller is mounted directly on the crankshaft. Maximum horsepower is 16 at 1600 r.p.m.



Georges Barbot, the aviator, and two-cylinder Clerget engine, which made record double cross-channel flight

How to Avoid Some Awkward Features in Phaeton Top Construction

Trend toward permanent type focuses attention on improvements. Correct principles of design help product conform to service conditions and give good appearance after usage. Closed car demand makes important increasing salability of open models.

By James Ferguson

PHAETON tops are still undergoing a transformation calculated to improve their appearance, to make them conform better to service requirements, and to overcome certain faults in construction which are displeasing to the eye. Improvements in design have resulted in part from the growing tendency toward a permanent non-collapsible top, which in appearance is superior to certain collapsible types.

Among the more important changes over former practice are the use of a back line which is less inclined; a design in which the high point is further to the rear, giving the top a thinner appearance; and the better balance secured by curving the lower line of the top downward at the rear quarter instead of leaving it straight as in some earlier designs.

To prevent bowing in of the fabric which forms the rear panel of the top, care is used to make the radius of the bow, as viewed in plan, about the same and approximately concentric with that at the rear quarter of the body. By this means unequal stretching of the fabric is minimized with the result that the fabric has less tendency to bow in. A concave line on the rear curtain is out of harmony with other body lines and thus tends toward an unsightly appearance.

Details concerning the above-mentioned factors, which have much to do with the appearance and salability of a phaeton, are given in the accompanying sketches and descriptive matter. They are of special significance when considered in reference to the growing demand for closed cars which makes it comparatively much harder to sell open cars.

Phaeton tops underwent a great transformation with the advent of the one-man design. Easy folding was the marked feature of this new type. But so few tops are ever folded down today that many manufacturers are making them stationary and more would do so were it not for the saving in shipping space which the folding top permits.

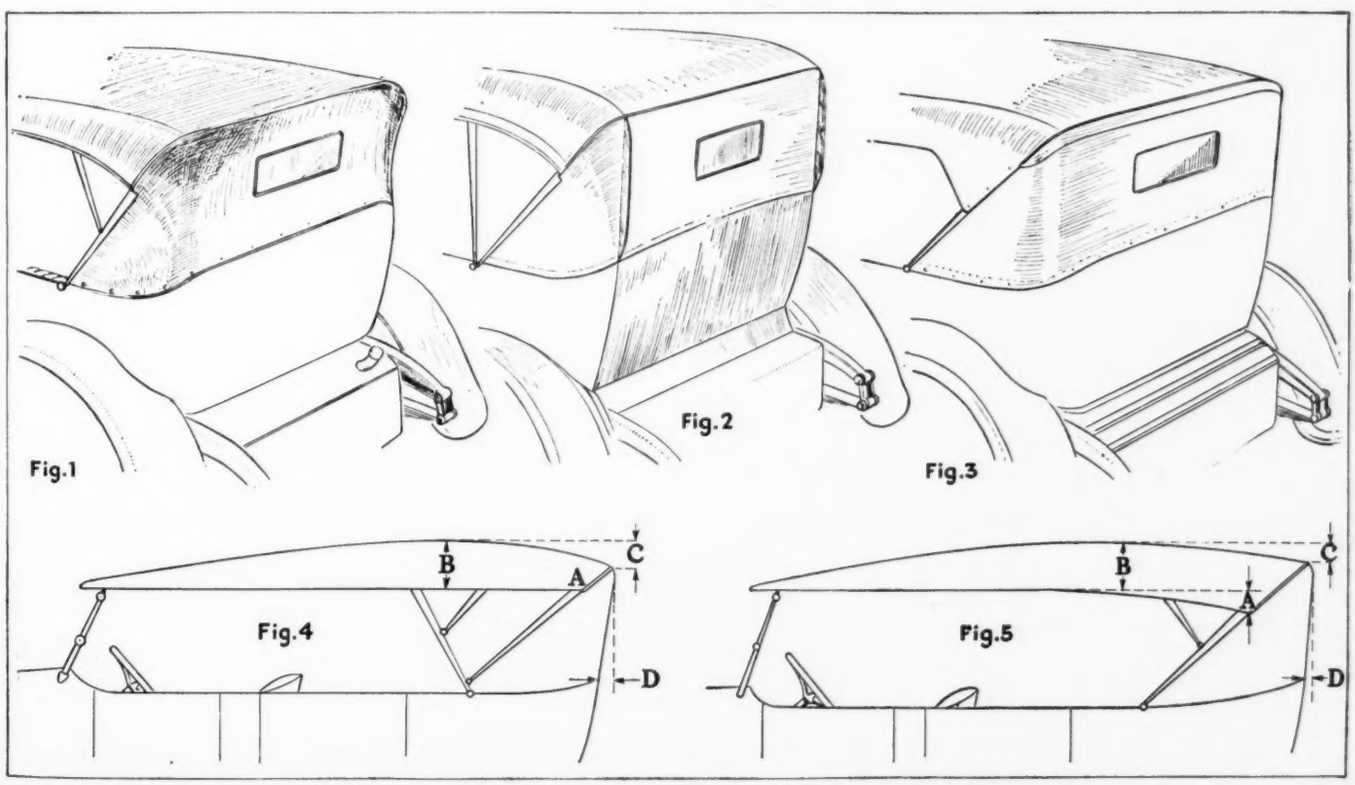


Fig. 1—Showing effects of unequal draw on fabric. Fig. 2—Use of comb to reinforce cloth. Fig. 3—Use of valance on high grade tops to hide draw-in below bow. Fig. 4—Side view of top showing dimensions formerly used. Fig. 5—Showing dimensions adopted for recent top design

The well-shaped back and corners of California and many other permanent tops, formed by drawing the covering material over steel panels and wood framing, have stimulated the makers of collapsible tops to improve their product at these points.

Fig. 1 illustrates a construction which is all too common. New tops often show a concave line between the bow and body when improperly designed. After usage the curved line will be accentuated between the bows and the top as well as on the back and corners.

Causes of Poor Top Shape

There are two causes for this poor shape. The first is the use of cheap thin fabric of single texture which is without sufficient body to form its own line. The diagonal cord of the drill upon which the waterproof coating is placed, tends to draw across the warp of the goods when under tension. In addition the cloth sometimes shrinks away from the rubberized coating.

The second cause is even more serious. It is due to a lack of symmetry between the radius of the body rear corner and that of the bow corner which prevents the fabric from remaining straight against the unequal strain, no matter how high-grade the material. The shade lines at the top left corner of the back shown in Fig. 1 illustrate the fact that the draw is unequal at this point. No fabric can be made to look pleasing unless the body corner has a radius which will permit it to drape naturally and fold around the corner without wrinkling.

When square cornered bodies were in vogue, a comb, as illustrated in Fig. 2, was used to reinforce the cloth. This method enabled the back to be kept straight providing the comb was sufficiently strong.

Fig. 3 shows a valance which is used on high grade tops, not as a reinforcement but to hide a draw-in just below the bow. This occurs on nearly all tops and is never considered a serious matter. However, the valance gives a more finished appearance to the top.

Attention given to the form of the corner has brought about a modification in the rake of the back. The dimension D, on Figs. 4 and 5, illustrates this change. Formerly this lean back was 2½ in. as shown in Fig. 4, while on most new tops it is not over 1 in.

Benefit from Reduction in Rake

Benefit derived from a reduction in the rake lies in the fact that the arc of the bow is more nearly above the arc of the rear body corner, thus making a more natural shape around which to form the fabric. Too much care cannot be given to harmonizing the body and bow corners, if a shapely back and corner is to be maintained after the car has seen service. This is especially true now that all phaeton bodies are made with gipsy curtains.

Tops which have been in service show a more even tension on the quarter and the material has fewer wrinkles when the quarter line is made, as shown in Fig. 5, as compared to that shown in Fig. 4.

Figs. 4 and 5, two side views of tops, show the deck and quarter lines. Fig. 4 shows lines which have been superseded on later models by those shown in Fig. 5. Dimension C on Fig. 4 was formerly about 4 in., while the same point on the new models (Fig. 5) is 2½ in. and the highest point of the top is further back, making it possible to have a straighter top line and makes the top appear thinner, although the distance through B is the same, usually about 11 in.

An interesting change is to be noted at A in Figs. 4 and 5. In the first illustration the quarter line is straight through from front to back, while in the latter it is dropped below the horizontal giving not only a better balanced line but also tending to make the front appear thinner, especially when the highest point of the top line is carried further back.

Top dimensions for three popular makes of cars are as follows:

B—9 in.; C—2 in.; D—1 in., and A—6½ in.
B—11 in.; C—3 in.; D—1 in., and A—2½ in.
B—11½ in.; C—3 in.; D—1 in., and A—3 in.

The semi-vision curtain shown in Fig. 3 has the same effect in overcoming the unbalanced appearance at A, Fig. 4, as the dropped line at A, Fig. 5.

The proportions of a top are governed less by fixed dimensions than by appearance. Consideration must be given to the size and shape of the body and the class of purchasers to whom it is expected to sell.

Bow sockets with their supporting mechanisms are made for definite lengths of top. Some sockets can be adapted to a varied length while others are so constructed that it is impossible to use them for more than one length. Mistakes due to the use of unsuitable sockets are uncommon for the manufacturer is usually on hand to give advice. Errors sometimes come about through decision to change the top after the bow sockets have been contracted for and delivered.

At the present time the tendency is toward the use of a stationary top and the elimination of sockets. These tops are often made to use the regulation storm curtains and the back and side curtains are made in the same manner as for a top with sockets. There are no metal reinforcing panels at the corners over which the material is stretched, consequently the same precaution must be taken to give bow and body corners corresponding contours as with folding tops.

Engineering Text Book Announced

ELEMENTARY textbooks on the automobile have been written almost without number, but owing to the progress of design there is a chance of improving upon the older ones from time to time. Aside from the possibility of including matter relating to recent developments, it is, of course, possible to improve upon the method of treatment, for in the writing of textbooks, the same as in the construction of automobiles themselves, finality has not as yet been reached.

Some of the general textbooks on the subject are of a very elementary character and are little more than mere compilations of descriptions of various parts and cars. A text which has recently been brought out by Gauthier-Villars & Cie of Paris (La Voiture Automobile, by H. Maillard, professor of automobile engineering in the French Army) is designed to fill a demand for a book intermediate between the class just referred to, and that of engineering works written for the benefit of designers.

With the aid of numerous diagrammatic illustrations this work describes the general construction and the mode of operation of every major part of the automobile, and it also has chapters on automobile operation, the diagnosis and repair of troubles, automobile law, etc.

THE twenty-first volume of The Engineering Index has just been issued by the American Society of Mechanical Engineers. The number of references has been increased materially and the system of cross-indexing has been improved. Although this volume specifically covers the year 1922, indexes are included for those periodicals received in 1921 too late for publication as well as for those periodicals received up to Feb. 15, 1923.

Factory School Trains Service Men to Do Better Repair Work

Classroom study provides detailed knowledge of adjustment, assembly and disassembly methods. Some engineering instruction given. Students sent by distributor and dealer organizations. Each course lasts two weeks. Expenses paid by the individual.

THE contribution of service to sales has often been overlooked because its influence is indirect. This situation is rapidly changing and the increasing size of the replacement market is causing attention to be focused on service as never before.

Manufacturers are contributing material help to distributors, and in some cases to dealers. This assistance takes several forms, among the most important of which is the training school.

In a recent address before the Service Managers' Convention of the National Automobile Chamber of Commerce at Detroit, T. W. Holloway, assistant technical manager of the Cadillac Motor Car Co., told about the Cadillac Training School and its efforts to educate service men throughout the country.

This school was organized to supplement instructional work carried on by the road men of the company. Each course lasts two weeks and is conducted during regular factory hours. Students are sent in by distributors and dealers, applications being accepted in order of receipt. No tuition charge is made by the factory and students pay their own living expenses. The distributor may pay the student's expenses, stipulating that the latter serve a certain length of time after receiving the instruction. This is, however, entirely in the hands of the distributing organization.

The school equipment is very complete, consisting of one car, rear axle assembly, crankcase with bearings and crankshaft, generator, distributor, carbureter, water pump, battery, electrical equipment, sectional parts and all necessary tools for adjusting, assembling and disassembling.

Construction of the car is explained by the instructor. Correct methods of assembling, disassembling and adjusting are taught, and instruction is supplemented by actual work on the car. Taking notes is compulsory.

Final Examination at End of Course

The Cadillac Shop Manual is used as a text book. A lesson is assigned each day and the students are examined on it the following morning. At the end of the course a final examination is given on the contents of the Shop Manual and the work of the course. Attendance rating, student's attitude toward the work, and corrected examination paper are forwarded to the party responsible for sending the student to the school.

By the end of the first week of the course the actual work of assembling and shop-testing of the car is completed. On Monday of the second week the car is road tested. This is followed by a trip through the foundries. The next day, shop work is done on the rear axle and the fitting of the main crankshaft bearing. Attention is focused on the adjustment of the spiral bevel driving gears and on marking gear teeth with red lead to get the proper tooth contact. Trips are then taken through the axle, main and connecting rod, and engine assembly departments.

To avoid the fatigue of factory sight-seeing the latter is limited to four afternoons a week, with class room work intervening in the mornings. One day is devoted to electrical work.

Following an inspection of the heat-treating department, a two to three hour talk about steel and methods of heat-treatment is given by L. A. Danse.

Evil of "Pirate" Parts Explained

Instruction is given in proper methods of straightening parts which have been bent in accidents, and dangers of using "pirate" parts are explained. Such parts are likely to cause trouble, especially in steering mechanism assemblies.

The chief engineer discusses some engineering topic, and the president occasionally addresses the students.

Holloway stated that the company does not expect to turn out a finished mechanic in two weeks, but that the school does make a better mechanic out of a good mechanic.

As has been mentioned before, the Training School was organized to furnish instruction supplementing that given by the road men, who are called "technical representatives." An outline of the duties of the road men will illustrate what instruction the Cadillac service man receives from other sources.

The technical representatives operate over a definitely laid out district. They visit distributor and dealer organizations and instruct the service men and mechanics in the best methods of diagnosing, adjusting and repairing. When necessary they meet the car owners with whom the distributor or dealer has had difficulty. They also inspect the shops to see that they are run properly and that a sufficient supply of parts is kept in stock. Reports are sent back to the factory.

For the most part the students of the Cadillac Training School are service managers, shop foremen and superintendents or high-grade mechanics. The school training gives them an insight into factory methods and management, together with a certain fund of technical information. Student contact with factory men undoubtedly helps to establish a closer connection between retailers and the parent company. In addition, the students are able to carry back with them helpful instruction to their less favored co-workers.

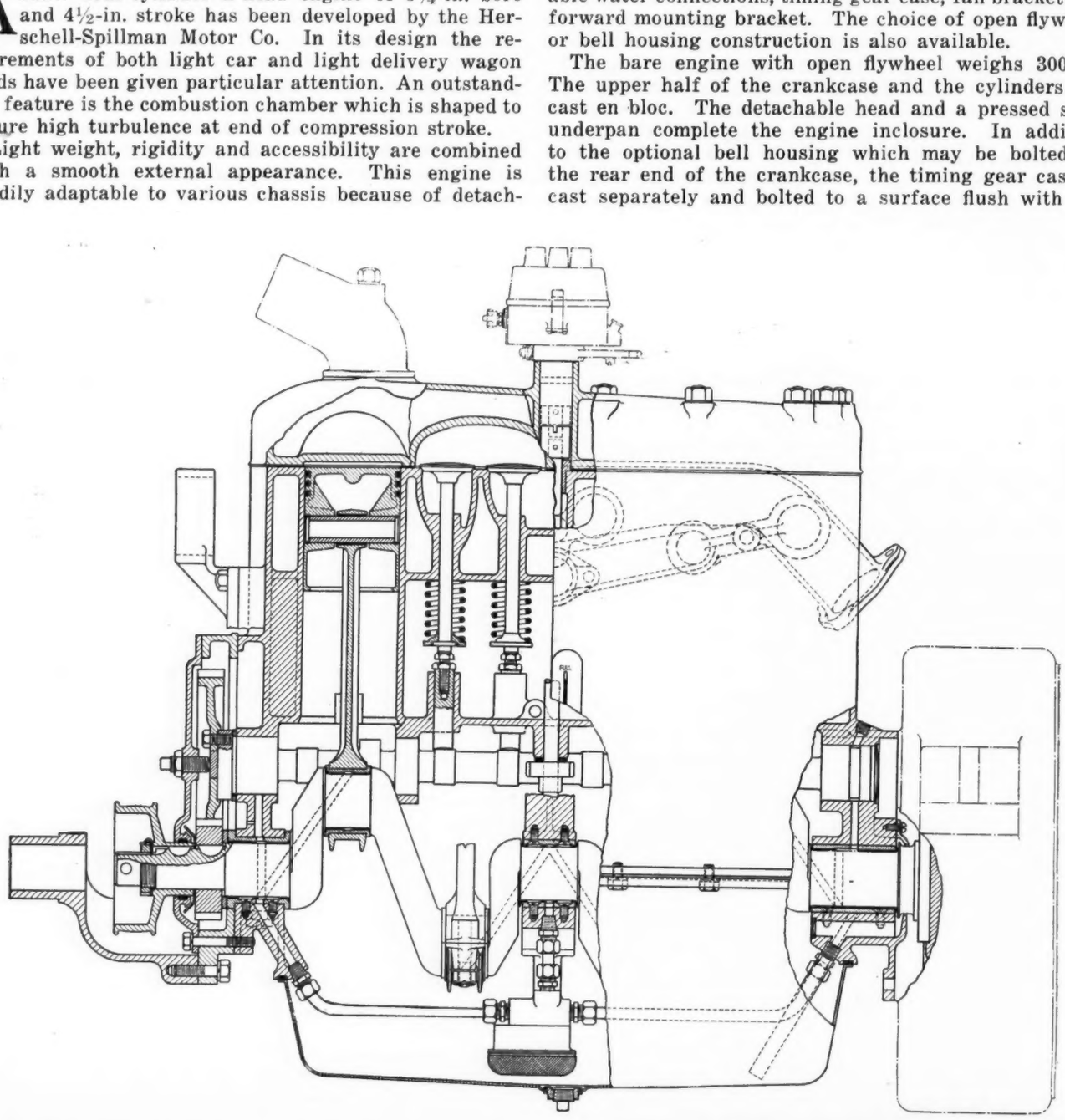
New Herschell-Spillman Engine Has Clearance Dome Over Valves

Design is such as to produce high turbulence at the end of compression stroke. Light weight, accessibility and rigidity combined with clean external appearance. Has detachable timing gear case. Is intended for light cars and delivery wagons.

A NEW four-cylinder L-head engine of 3¼-in. bore and 4½-in. stroke has been developed by the Herschell-Spillman Motor Co. In its design the requirements of both light car and light delivery wagon fields have been given particular attention. An outstanding feature is the combustion chamber which is shaped to secure high turbulence at end of compression stroke.

Light weight, rigidity and accessibility are combined with a smooth external appearance. This engine is readily adaptable to various chassis because of detachable water connections, timing gear case, fan bracket and forward mounting bracket. The choice of open flywheel or bell housing construction is also available.

The bare engine with open flywheel weighs 300 lb. The upper half of the crankcase and the cylinders are cast en bloc. The detachable head and a pressed steel underpan complete the engine inclosure. In addition to the optional bell housing which may be bolted on the rear end of the crankcase, the timing gear case is cast separately and bolted to a surface flush with the



Longitudinal and transverse sectional views of new

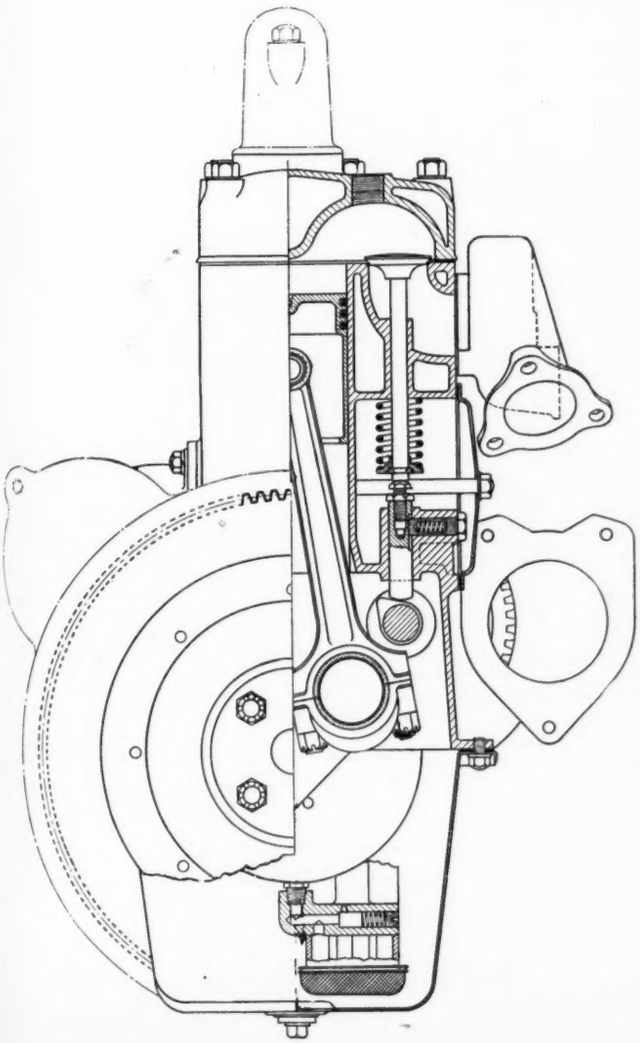
forward face of the front main bearing and camshaft bearing. The front mounting bracket is bolted directly to this gearcase, but is separate from the gear case cover.

The engine is of the three-bearing type. The diameter and length respectively of the main bearings are: Front, 1¾ x 2 in.; center, 1 25/32 x 1⅞; rear, 1 13/16 x 3 in. The connecting-rod bearings are 1¾ x 1½ in. long. All crankshaft bearings are of the bronze backed, babbitt-lined type.

The half bearings are held in the crankcase by brass screws and in the lower end of the connecting-rod by brass rivets. No shims are used in either main or rod bearings.

Connecting rods measure 8¾ in. between centers and are of I-section. Two 7/16-in. bolts are used at the lower end. The upper end of the rod is bronze bushed for the ⅞-in. diameter piston pin, the bushing being 1⅜ in. long. The piston pin, which floats in both rod and piston, is drilled out for light weight and is 3 3/32 in. long. Snap rings are inserted in grooves in the piston bearings to prevent the pin from shifting endwise.

Medium weight, cast iron pistons are used. The skirt is 4 in. long, the pin being 2 in. from the head. Three 3/16-in. rings are located above the pin. The combustion chamber is of the type in which the clearance space is mostly over the valves with small clearance over most of the piston head. The compression ratio is 4:1. Cast iron head valves of 1⅝ in. clear opening diameter and 5/16-in. lift are used in both intake and exhaust ports.



3¼ x 4½ in. Herschell-Spillman engine

The valve seats are completely surrounded by water. The valve stems are 7/16 in. diameter with grooves cut in near the lower end for the spring cup and clip spring retainer. The springs are 1 5/16 in. in outside diameter and are 2 in. long when the valves are closed. Pressed steel cover plates inclose the valve mechanism.

The camshaft, which is 1 in. diameter between cams and bearings, is carried in four bearings which are reamed in the crankcase, no bushings being employed. These bearings are located at the front and rear ends of the right side of the block and between cylinders 1 and 2 and cylinders 3 and 4. The diameter and length respectively are: Front, 1⅞ in. x 1½ in.; second, 1 27/32 x ¾ in.; third, 1 13/16 x ¾ in., and rear, 1 25/32 x 1 9/16 in. Bearings and cams are all hardened and ground.

Tappet Arrangement Facilitates Assembly

The tappets are ⅝ in. diameter with an adjusting screw and lock nut at the upper ends. As their lower ends are rounded to improve the valve opening diagram, rotation is prevented by a spring actuated plug which bears in a slot milled in the barrel of the tappet. This arrangement facilitates assembly and service work as the engine may be swung in any position with no possibility of the tappets dropping out.

Metallic timing gears of ⅞-in. face and 9 pitch helical teeth are standard practice in this engine. The manufacturers state that since they made their tool room foreman responsible not only for gear cutters but also for the finished gears, excellent results have been obtained. All timing gear cutting is now a phase of tool room operation and receives tool maker's care and precision.

The camshaft gear is fastened to a flange on the camshaft by four ⅜-in. cap screws. The entire assembly is adjusted for endwise motion by a hardened screw which is fitted in the gearcase cover. A fiber ring is placed between the camshaft flange and the front bearing. This ring is centered on an extension of the front camshaft bearing and permits adjustment for any endwise wear or play.

In accordance with their established practice, the manufacturers have provided an endwise adjustment on the crankshaft. A 3/16-in. thick steel ring is centered for about half its thickness on a forward extension of the front crankshaft bearing. The crankshaft timing pinion is drawn up by an external nut against this ring instead of the shoulder formed by the crankshaft bearing as is the usual practice. The external nut also holds the fan drive pulley and oil slinger in place.

As the timing gear case, gearcase cover and front engine support are all separate pieces, a great range of selection of types of auxiliary units and mountings is permitted. In the standard construction, a No. 1 S. A. E. generator mounting pad is placed on the right side of the engine.

The flywheel is held on the rear end of the flanged crankshaft by four ½-in. bolts on a 1⅝-in. radius. The weight of the flywheel is 45 lb. and 109 8/10 pitch teeth are cut on its periphery to mesh with a 11-tooth Bendix pinion. The pitch diameter is 13.625 in. A No. 2 S. A. E. inboard starter mounting flange is used with the inclosed flywheel type. The bell housing in this case is No. 5 S. A. E. standard.

All main crankshaft and lower rod bearings as well as the two end camshaft bearings are pressure lubricated. The two center camshaft bearings, cylinder walls, piston pin bearings and valve tappets are lubricated by splash from the rotating rod ends. The gear type oil pump is mounted in the bottom of the pan at the center bearing. It is driven by helical gears from the camshaft. Oil is carried to the three main bearing caps

through ⅜-in. copper tubing. The crankshaft is drilled diagonally to supply the lower rod bearings. The main bearings are grooved clear around to provide a continuous oil flow. Drilled holes in the block supply the end camshaft bearings from the end main bearings. A take-off for the dash oil gage is provided at the rear camshaft bearing.

A screen is fastened around the oil pump body and an adjustable relief valve is located in the pump outlet. This valve is set for the required pressure during the run-in at the plant.

The oil pump driveshaft extends upwardly through a cored passage in the cylinder block and is carried on a bushing which is inserted at the cylinder head joint surface. Provision is made at this point in the cylinder head for an S. A. E. B type clockwise distributor mounting. This arrangement permits very short high tension leads to the ⅞-18 thd. spark plugs in the cylinder head.

External manifolds have been adopted on this engine in order to permit adaptation to the changes in the characteristics of motor fuel which may occur from time to time. In the present design the intake and exhaust manifolds are cast integrally. A hot spot is arranged at the center in line with the center exhaust port, some additional heat is provided at the elbows where the branches of the intake passage turn toward the cylinder block. Provision is made on the present manifold for a 1-in. side outlet carbureter with standard S. A. E. flange with horizontal bolt center line. The diameter of the outlet of the exhaust pipe is 2 in.

Both the water intake and outlet elbows are detachable. The intake which is suitable for 2¼-in. inside diameter hose is on the center line of the engine on the left side. The water outlet which fits the same size hose is near the forward end of the cylinder head. A combination breather and oil filler is placed on the left side of the block near the front. An oil level float indicator is located just back of the center line on the same side.

The fan bracket, which is provided in the present design, is suitable for a 16-in. fan and permits 1⅞-in. vertical adjustment. A drop-forged starting crank with roller handle is supplied with each engine.

The firing order is 1-3-4-2. The exhaust valve opens 45 deg. before bottom dead center and closes 8 deg. past top center. The intake opens 8 deg. before top center and closes 45 deg. past bottom center.

This company is also preparing to build a six-cylinder engine of the same cross section for light cars.

Centerless Grinder Design for Plain Cylindrical Work

A NEW centerless grinder, intended primarily for the continuous production of plain cylindrical work up to 4 in. maximum diameter, has been placed on the market by the Detroit Machine Tool Co. It is adapted particularly to such parts as piston pins, gear shafts, valve parts, roller bearing parts, rubber or fiber rods and drill rods.

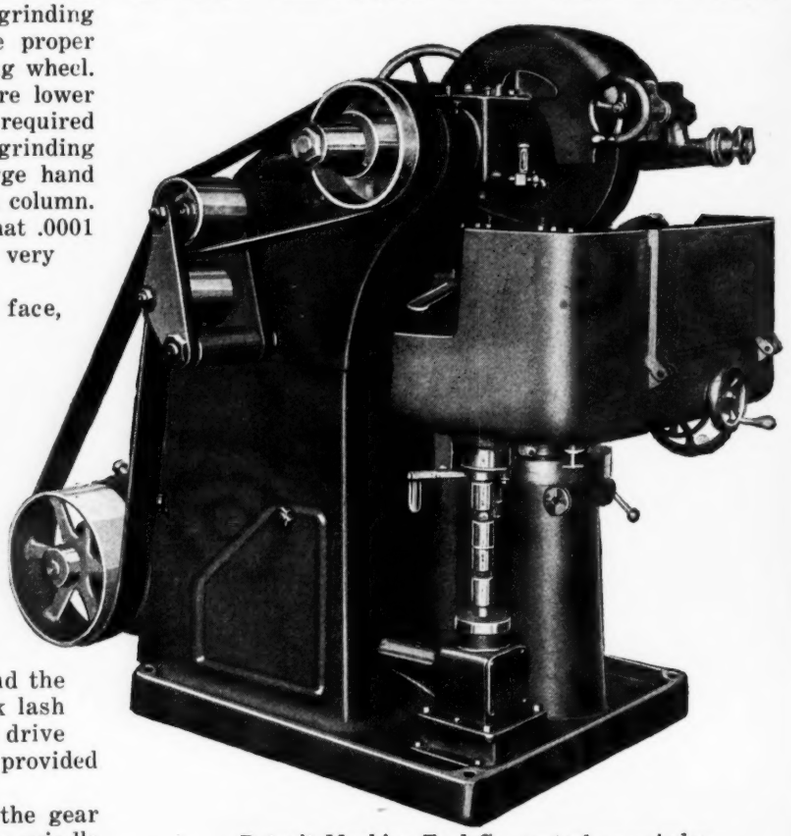
The basic principle followed in the earlier No. 4 grinder is continued in this No. 4-B machine, as the lower or feed wheel is directly below the grinding wheel while work in process rests upon and is rotated by it at all times. The feed wheel is double the width of the upper or grinding wheel, the additional width bringing about the proper rotation of the piece as it approaches the grinding wheel. The rate of feed is varied by rotating the entire lower column, which carries the feed wheel, to any required angle up to 10 deg. maximum, with relation to the grinding wheel. Diameter of work is controlled by a large hand wheel which adjusts the height of the feed wheel column. As the dial of the hand control is graduated so that .0001 in. variation of work diameter appears as ¼ in., very minute settings may be made.

A single pulley of 12 in. diameter and 6 in. face, running at 750 r.p.m., drives the entire machine through a two-speed gear box. The change gears permit two grinding wheel speeds, 1080 and 1176 r.p.m., and two feed wheel speeds, 33 and 44 r.p.m. These grinding wheel speeds are based on a 14-in. diameter 5½-in. face grinding spindle driving pulley on the gear box shaft. Other grinding speeds may be obtained by changing the diameter of this pulley.

Any tendency toward unsteady rotation of the feed wheel due to belt slippage is eliminated, since the drive is taken from the change gear box through a set of bevel gears and the vertical universal shaft shown in the cut. Back lash in the feed wheel is prevented by a worm drive on the feed wheel spindle with an arrangement provided to compensate for wear.

The grinding wheel is driven by a belt from the gear box pulley over a ball bearing idler to the grinding spindle pulley. An interesting feature of the grinding wheel drive is the method used for connecting the wheel spindle and the spindle pulley. The ball bearing pulley is mounted on a stud which is supported at the outer end by a cast iron bracket. The inner side of the pulley carries a plate having a splined hub which engages with the splined end of the wheel spindle, forming a flexible coupling.

A diamond point device for truing the grinding wheels is carried on a bracket which forms an integral part of the design. The complete machine weighs about 5000 lb.



Detroit Machine Tool Co. centerless grinder

Production Efficiency Offsets Rise in Wages and Material Prices

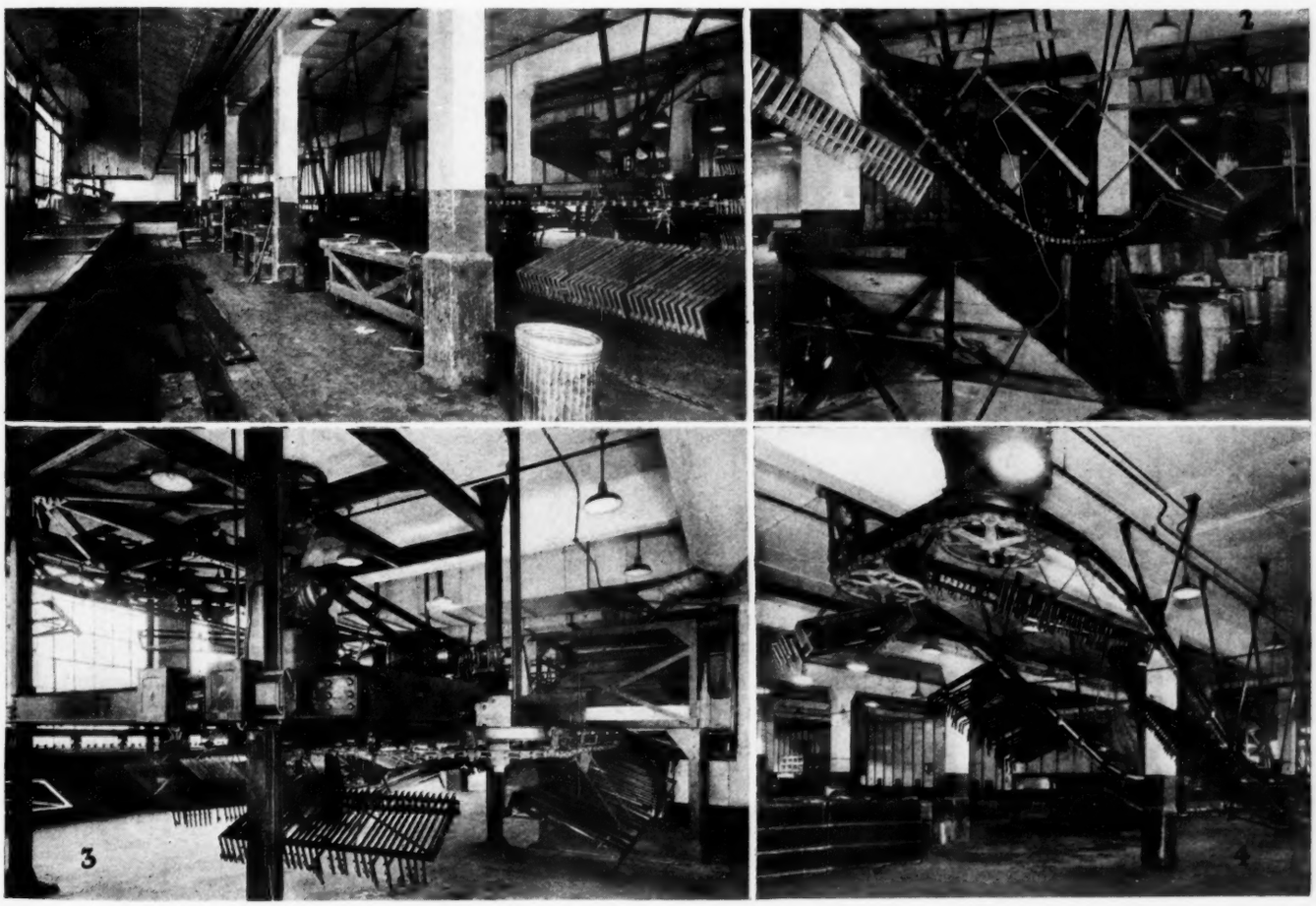
Overhead conveyor installation cuts unit cost of enameling windshield frames at Ternstedt plant. System to be extended to manufacturing departments. Pressure ventilation provides pleasant working conditions. Quality of product improved.

BY installing an overhead conveyor chain system for handling windshield frames in the enameling department, the Ternstedt Mfg. Co. has saved enough to offset a 10 to 40 per cent increase in materials and a 15 per cent increase in wages. Reduction has been effected in the labor necessary to truck parts about the plant. Fewer pieces are rejected and a more constant output per labor unit has been attained.

So successful has the system been that the Ternstedt company intends to extend it to other departments handling even smaller parts. The installation of this Miller & Hurst overhead conveyor chain has resulted, not only in the economies mentioned, but in providing an incomparably brighter, cleaner shop, which has undoubtedly had a considerable psychological effect on the employees. It has, furthermore, made possible the employment of women for handling most of the work, whereas men were needed previously for a great many of the operations.

The conveyor chain is 1200 ft. long. It takes the frame through a winding path for the various operations necessary in enameling.

Windshield frames entering the enameling department



1—Conveyor loading points. Windshield frames are taken from the cleaning tank shown at the left and are loaded on the conveyor racks shown at the right side of this illustration. 2—Windshield frames entering priming coat dipping tank and passing over drainway on way to first oven. 3—Windshield frames entering second oven after second coat has been sprayed on. This illustration also shows the 2-hp. motor drive which operates the 1200-ft. conveyor chain. 4—Final loop of the conveyor which brings the windshield frames to the inspection and shipping department. After leaving this point the conveyor goes back to the cleaning tanks where operations are started

directly from the manufacturing division are covered with the usual deposits of oil, grease, and acid incident to their manufacture. As a preliminary to enameling, all the oil, dirt, and grit are washed off in the usual way—by cleaning in an alkali solution, pickling in a weak acid solution, and rinsing. Washing operations are continuous and are performed in a series of tanks. Frames are piled on a rack which is carried over the tank series on an overhead I-beam.

After washing, each windshield frame is tack wiped and placed on the racks permanently attached to the conveyor system proper. Then the enameling operations actually begin. The conveyor moves at a speed of approximately 2 ft. per min., and a 1 hr. bake is obtained in each of the three ovens through which the piece passes. The racks have been so designed as to enable one operator or a group of operators to properly process all the frames on one rack while it passes.

Three coats of enamel are applied. The conveyor passes first through a dip tank filled with the primer coat, and thence, after proper drainage time, into the first baking oven. This is a Maehler automatic gas oven, with automatically controlled temperature. After leaving the first oven the frames are sanded and rubbed when necessary; then the second enamel coat is sprayed on. Next the frames pass through the second baking oven. Then the third coat is sprayed on and the frames pass through the final baking oven. The conveyor carries the frames to the inspection department, where they are carefully gone over and wrapped for shipment. The racks then proceed overhead to the starting point.

Cleanliness of plant and air is needed in the room devoted to enameling work. To obtain these a pressure ventilation system has been installed. The entire room is sealed, all entrances are air-locked, and a continual supply of fresh air is pumped into the room by a fan capable of supplying approximately 50,000 cu. ft. of air per min. This keeps the room under about two atmospheres pressure. Air is drawn from the outside of the building and passes through a filtration system to insure an absolutely clean atmosphere at all times. Not only does this system deliver clean air and prevent the entrance of dust and foreign material, but also provides cooler and more satisfactory working conditions in warm weather.

The entire 1200 ft. conveyor chain is driven by a 2-hp. electric motor through a 400 to 1 reduction gear. The motor is fitted with an automatic take-up which eliminates slack from the chain. The fact that the conveyor system is overhead has cleared the floors of trucks, racks and all other material which would naturally be expected to clutter up a small parts manufacturing department.

One of the unexpected results of the installation of this conveyor system has been improvement in quality of work. Because the frames enter the priming dipping tank slowly and regularly, priming is more uniform. Greater uniformity in enameling is obtained because the temperature to which the racks are exposed is always the same. Passing through the ovens on a straight line and always at the same level, the frames are kept at a more even temperature than would be possible if they were piled on trays.

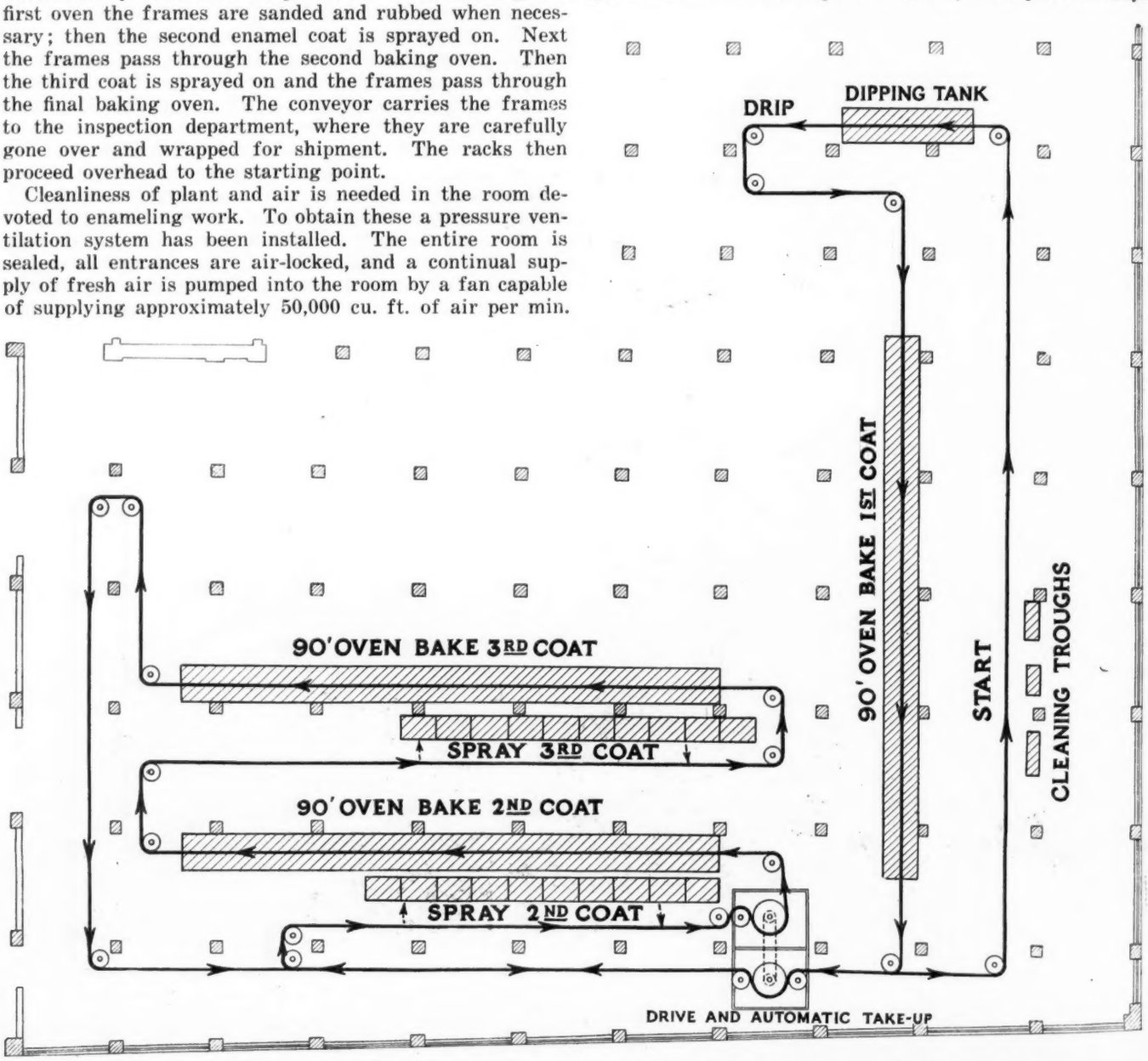


Diagram of installation of the Miller and Hurst overhead conveyor in the windshield frame enameling department of the Ternstedt Mfg. Co.

New Device Tests Material Hardness by Means of Pendulum Structure

Gages substances by two entirely different methods. First involves observation of amplitude of oscillation from zero; second, the timing of several swings and averaging result. Great variety of materials can be checked by new instrument.

AN instrument for measuring hardness of materials ranging from lead to sapphire has been developed, depending for readings upon the oscillation of its entire structure as a pendulum.

An inverted U-shaped cast frame weighing several pounds is fitted with a short vertical axis having a steel or ruby ball of 1 mm. diameter seated in its lower end. A curved leveling glass and scale reading 0-100 lies along the top of the inverted U frame. The radius of the leveling glass has its center at approximately the center of the contact ball which acts as the fulcrum of the pendulum. The inverted U frame is several inches in width between ends and the scale reading 50 lies in the vertical plane directly over the axis of the contact ball. Immediately above the ball, a cylindrical weight is mounted upon a micrometric screw, adjustment of which varies the length of the pendulum arm. The frame is also fitted with six adjusting screws to obtain accurate static balance.

For ordinary inspection purposes, a pendulum arm of 0.1 mm. (.0039 in.) is used. Hardness of any material, irrespective of size, shape or mass, may be determined by two methods; first, by observation of the amplitude of one oscillation from 0, and second, by timing several oscillations with a stop watch and averaging the result. The hardness scales for the two methods are not alike and may vary somewhat for the same material. Generally speaking, the first method is largely for the classification of different materials for heat treatments and the second for inspection of comparative results on a given piece or similar treatment.

Method of Indicating Hardness

In practice, the piece to be tested is held rigidly in a horizontal position and the ball applied lightly on a flat surface. In the first, or scale method, if the instrument is tilted until the bubble in the scale glass is at 0 and placed in that position on the piece to be tested and released, it will swing pendulum fashion and the position of the bubble at the end of the first oscillation will indicate the relative hardness. The calibration of the instrument is based on the theory that the ball slightly indents the surface, and as the pendulum swings, will roll out or elongate the indentation. The energy absorbed in displacing the metal is taken from the potential energy of the pendulum and is indicated by the length of the first swing. The position at the end of the first swing shows the work done by the ball on the specimen and measures its hardness.

Following are the readings for several materials when a steel ball is used:

Glass	97
Very hard carbon steel	93
Hard carbon steel	88
Tempered high speed steel	75
Annealed high speed steel	54
Annealed carbon steel	41
Rolled brass	14
Cast brass (soft)	4
Lead	0

In the second method, the instrument is placed on the piece with the indicator at or near 50 on the scale and set in oscillation by a very light impulse. The average time of a number of oscillations is taken, the number varying with the material involved.

In this method, the work done in oscillation is a result of the compressive wave set up ahead of the ball in each direction, or several repetitions of the first method. The readings for various materials by this method are as follows:

Glass	100
Very hard carbon steel	75
Hard carbon steel	65
Tempered high speed steel	52
Annealed high speed steel	26
Annealed carbon steel	22
Rolled brass	15
Cast brass (soft)	11
Lead	3

Herbert pendulum hardness tester

For comparative study of hardness of similar pieces or treatments, it is possible to neutralize or reverse the pendulum action to increase the numerical difference between results. For example, three pieces of high speed steel A, B, C, which were supposed to be hardened alike, were tested with the following results:

Pendulum length.	A	B	C
0.1 mm.	57	58	62
0.0 (neutral)	66	70	75
— 0.1 mm. (reversed)...	77	85	102

The maker of this instrument, Edward G. Herbert of Manchester, England, recommends the time test as giving uniform and concordant results for general purposes, extreme accuracy in leveling or smoothness of surface not being essential.

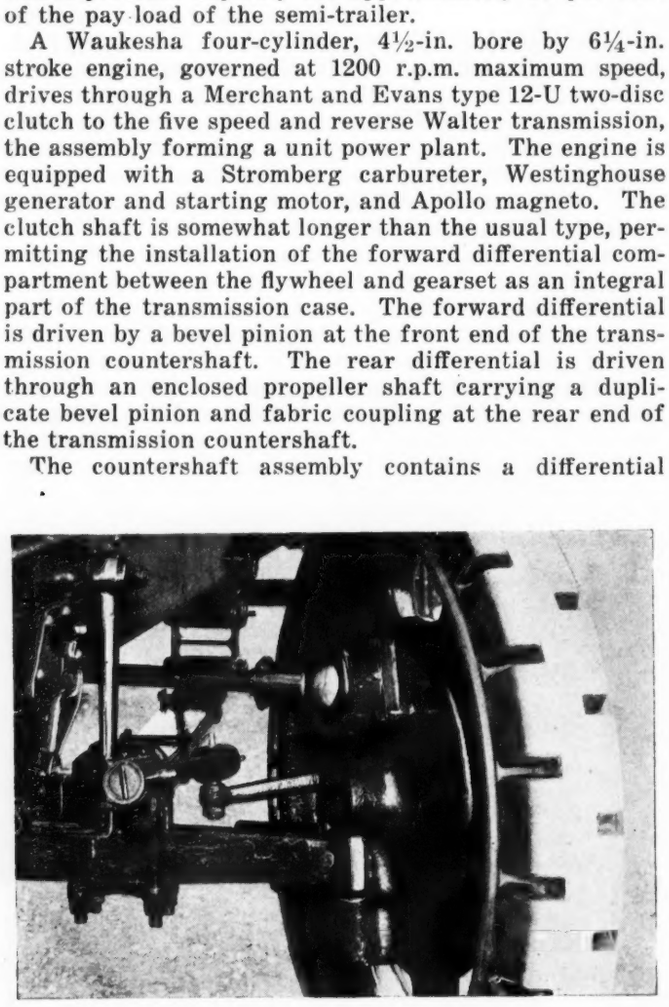
Walter Now Producing Four-Wheel Drive Tractor Truck

A FOUR-WHEEL drive tractor-truck chassis has been announced by the Walter Motor Truck Company. The short wheelbase, small turning radius and rugged construction particularly adapt the product for haulage use with a 15-ton pay-load semi-trailer. The design is an outgrowth of the four-wheel drive Tractor Snow Plow built by the same company, which was used with great success during the past winter.

In common with the recent practice of this company, the suspended drive feature has been retained in this model. In place of being mounted on the axle, as in the conventional types, the differentials and their housings are suspended from the frame, drive being transmitted to the four internal gear-driven wheels by short transverse shafts. The chief changes are the shorter wheelbase and a much heavier rear axle construction, which provides capacity for approximately 40 per cent of the pay load of the semi-trailer.

A Waukesha four-cylinder, 4½-in. bore by 6¼-in. stroke engine, governed at 1200 r.p.m. maximum speed, drives through a Merchant and Evans type 12-U two-disc clutch to the five speed and reverse Walter transmission, the assembly forming a unit power plant. The engine is equipped with a Stromberg carbureter, Westinghouse generator and starting motor, and Apollo magneto. The clutch shaft is somewhat longer than the usual type, permitting the installation of the forward differential compartment between the flywheel and gearset as an integral part of the transmission case. The forward differential is driven by a bevel pinion at the front end of the transmission countershaft. The rear differential is driven through an enclosed propeller shaft carrying a duplicate bevel pinion and fabric coupling at the rear end of the transmission countershaft.

The countershaft assembly contains a differential which equalizes the drive to front and rear axles while turning, as steering is effected by only the front wheels. All three differentials are of a self-locking type, developed by this company. The rear differential housing is carried on the frame of the truck. The drive, both front and rear, is transmitted to the wheels by short transverse shafts fitted with universal joints at both ends. The universal action of these shafts compensates for spring deflection and allows the front wheels to be swung through a maximum angle of about 35 deg. for steering purposes. The final drive at the cast steel wheels is of the enclosed internal gear type.



Steering mechanism and front wheel drive of Walter tractor truck

Equipped with Six Brakes

Six brakes are provided, four being carried at the outer ends of the transverse differential equalizing gear shafts and two bearing on the outer surface of the rear wheel internal gear housings. The four brakes on the differential shafts are connected to the foot pedal, each being 10 in. diameter and 5 in. face. Rear wheel brakes, which are connected to the hand lever, are 21 in. diameter and 2½ in. face.

As the forward transverse differential lies between the gearbox and clutch, the entire engine extends ahead of the front axle and is therefore very accessible for bearing adjustment. The overhanging weight tends to equalize the load on all four wheels when hauling the semi-trailer. As the pivot center of the trailer is placed 6 in. ahead of the center of the rear axle, a portion of the pay-load is also applied at the front wheels. The maker states that the arrangement of the entire power plant and driver's compartment over the front axle results in easy riding, as the front springs are designed to carry a load which varies within a comparatively small range.

The wheelbase of the tractor-truck type is 100 in. and the tread is 68 in. front and rear. Single tread tires at the front and dual tread at the rear are all 40 in. x 7 in., solid type. The frame is liberally reinforced by long, heavy gussets at the ends of the cross members, side and end channels being made of ¼ in. pressed steel, 8 in. deep, with 3 in. flanges. The total weight, including driver's cab but without the trailer pivot support, is 9100 lb. The cab is equipped with half-doors, ventilating windshield and curtains. A 20-in. steering wheel with manual control quadrant and long, centrally located gear shift and brake hand levers with conveniently placed pedals make for easy operation. Eight-inch electric head lamps are set in the dash alongside of the hood.

A broad range of speed and drawbar pull results from the five-speed transmission. The maximum total gear ratio is 85 : 1 and the minimum 8.5 : 1. At 1200 r.p.m. of the engine, the corresponding drawbar pull is 10,000 lb. and 1000 lb., respectively. The maximum speed of the truck at full governed speed of the engine is 16 m.p.h. The minimum turning radius over the outside of the chassis is 18 ft. The same general design is followed in two longer wheelbases, 136 and 160 in., respectively.

Industry Trying to Decide What Is Fairest Form of Tax

Many contend levy on fuel would be most equitable if levied in lieu of all other imposts. Object to its use merely as means of raising additional revenue. Formulation of definite platform essential if concerted stand is to be taken by all interests.

WHAT is to be the future of motor vehicle taxation? Is the problem to be solved promptly with justice to all parties or will it hang on for years, a football to be kicked about by legislative and municipal interests?

Is the gasoline fuel tax the solution, and how should it be applied to be equitable?

These are questions which automotive interests would like to see settled as soon as possible. There is hardly any subject pertaining to the industry upon which there is wider divergence of opinion. Motor vehicle taxation is full of unknown quantities, but there must be a solution, and that quickly. All factions are more or less in agreement on this point.

The chief difficulty is in agreeing upon a program which will be satisfactory to everyone concerned. Consideration must be given the rights of taxpayers as a whole as well as the peculiar interests of motor vehicle users. There is no possibility of lightening of the tax burden which operators of passenger cars and trucks are carrying. The chief menace at this time lies in the inclination of legislators to make additional levies on them.

The taxation problem is as old as good roads and it becomes more or less acute with the opening of the State legislative sessions each year. It has become especially serious at this time so far as the automotive industry is concerned, because of the distinct reaction against the expenditure of large sums for the construction of hard surfaced highways.

The gasoline tax which already has been adopted by nearly two-thirds of the States has ceased to be a novelty although it is only three or four years old. In most cases it has been devised as a new means of raising revenue instead of being used as a more equitable form of taxation than a levy based on horsepower and gross weight.

Maintenance to Be Paid by Motorists

Only one general tax principle has been accepted thus far by the automotive industry. That is that the original cost of constructing improved highways should be borne by society as a whole and by the owners of abutting property in particular while the cost of maintenance should be carried by the users of the roads. It is conceded that motor vehicle users should carry most of the burden of maintenance.

No agreement has been reached on the question of what form of special tax is most equitable. The Motor Vehicle Conference Committee has advocated a tax based on both horsepower and gross weight as the best means for raising the total in any State. Many persons within the industry believe, however, that a single tax on gasoline in lieu of all other taxes for highway maintenance is a better and more equitable form of impost. An increasingly large number of State highway commissioners and engineers are advocating a gasoline tax as a substitute for all others now used to raise revenue from motor vehicle operation.

One difficulty which has confronted the Motor Vehicle Conference Committee in its past efforts to provide a uniform taxation platform upon which the motoring interests of all States can stand while their legislatures have been in session has been tardiness of the organizations the conference represents in agreeing upon primary principles for which to contend. It is felt that a plan of operation for each legislative season should be mapped out several months in advance.

Chamber to Discuss Taxation

The subject of taxation will be discussed, therefore, at the annual meeting of the members of the National Automobile Chamber of Commerce to be held in New York, June 7. The entire question will be presented by the special committee appointed to study the subject of a gasoline tax. This committee is composed of H. H. Rice, chairman; Roy D. Chapin, A. R. Erskine, C. C. Hanch, W. E. Metzger and W. T. White.

A memorandum prepared by this committee says, in part:

"Special taxes are explained and justified by the theory that the objects furnished or services performed by the money derived from such special taxes are of particular or peculiar importance or necessity to the persons or things or classes of persons or things which pay them.

"This is the basis for most of the annual registration fees, gasoline taxes and other forms of taxes which are annually levied by our States on the motor vehicle and its owners and operators.

"If the theory of Special Taxation for the Motor Vehicle is rejected then the task is to secure Federal, State and local laws wiping out of existence all such taxes and leaving only a charge necessary to pay for the administration of the motor vehicle departments.

"During the past twenty-five years, however, motor vehicle manufacturers, dealers and users have not opposed, but have even encouraged, special taxes for highway maintenance, and in many cases even for reconstruction and new construction of improved highways. It is very doubtful, therefore, if at this late date they can reverse themselves on this subject.

"Assuming, therefore, that the theory of Special Taxation for Motor Vehicles is sound, it is apparent that motor vehicle manufacturers, dealers and users must determine what are the particular expenditures of Government that these special taxes shall defray.

"Following is the platform of the Motor Vehicle Conference Committee on the subject. It is an expansion of a resolution adopted last January by the Directors of the National Automobile Chamber of Commerce:

1. The State should be the sole taxing agency—Federal, County and Municipal Governments to be excluded from the field.
2. The total amount of taxation should be limited to the sum of money necessary for:
   a. Administration of State Motor Vehicle Department;
   b. Maintenance of Improved Highways of the State.
3. The term "maintenance" and the items which it shall include should be sharply defined and strictly limited in application.
4. No money derived from special taxation of the motor vehicle should be spent for maintenance of highways unless such highways are located where the highway transportation needs of the State require and unless such highways are built of materials and in a manner to meet these needs.
5. The total amount of justified taxes should be raised in a manner which most equitably distributes the cost among the various classes of vehicles and the units within each class.
6. All money raised by such special taxes should be placed in the State Motor Vehicle Maintenance Fund and spent by the State or under State supervision on the improved highways in the order of their importance and in accordance with their maintenance needs.

"The Motor Vehicle Conference Committee has been advocating a tax based on both horsepower and gross weight as the best means for raising the total of such taxes required in any one year in any one State to defray the logical and justifiable expenditure that should be met by the motor vehicle.

"Many feel, however, that a single tax on gasoline or else a tax on gasoline for highway maintenance with a nominal flat rate charge to cover the administration of the State Motor Vehicle Department would prove a far better and more equitable method of taxing the motor vehicle."

It is pointed out in the memorandum that the committee must determine what type of tax or taxes should be used to meet the special levies on motor vehicles and how this tax or taxes should be scientifically and equitably apportioned among the various kinds of vehicles. This is the subject upon which it is most anxious to obtain the views of the members of the Chamber.

The gasoline tax already has been adopted in the following States:

Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Indiana, Kentucky, Louisiana, Maryland, Mississippi, Montana, Nevada, New Mexico, North Carolina, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, Wisconsin and Wyoming.

There has been no special uniformity in the gasoline tax legislation. Usually it has been an additional levy against motor vehicle users. In the agricultural States the bills have been so framed that the law will impose no hardship on farmers using gasoline for power farming.

British Association Agrees on Standard Body Nomenclature

THE British Engineering Standards Association, in conjunction with the associations representing makers and users, has recently issued a report embodying agreed decisions as to nomenclature of automobile bodywork. While the terms adopted should be of considerable interest to American exporters and advertisers, there is some doubt as to their general adoption in England. Both the press and manufacturers' catalogues have almost completely ignored the chassis nomenclature adopted by the same association.

Little or no inclination to adopt American terms has been shown in the report. Terms applying to details of body construction are therefore of interest only to British body makers. The accompanying table of body types will serve to distinguish the differences between American and British nomenclature.

The names "roadster" and "sedan" do not appear, although the latter is gaining in general usage because of its use by American car distributors. As "saloon" is still in general use, this term has been retained for the latter. The term "hood" is retained to specify a collapsible and detachable top provided with detachable curtains or panels that open with the doors. A distinction is drawn between "hood" and "head," the latter being defined as a collapsible but *not* detachable covering forming a constructional part of the body.

Any of the above bodies built on the lightest and smallest possible lines would be qualified by the term "Sporting." The addition of folding seats in the deck or boot of the car does not alter the name of the car. The width of seat for the accommodation of two or three passengers does not affect the nomenclature. No distinction is made in the name of car for divided seats of fixed, tilting or sliding types.

British Standard Nomenclature for Body Types

	Open	Closed	With hood or head to fold partially down	With hood or head to fold down entirely
One seat to carry 2 or 3 persons	Two Seater	Coupé	Coupélette	Coupé Cabriolet. Addition of window at back of door will alter name to "Three Quarter Coupé Cabriolet"
Seats for two in front and one behind. Divided front seat	Clover Leaf	Clover Leaf Coupé	Clover Leaf Coupélette	Clover Leaf Cabriolet
Two seats to carry 2 or 3 persons on each	Touring	Saloon. (No partition behind driver)	Saloon Landaulette	All-weather (2, 3 or 4 doors; glass windows)
Driver's seat partitioned from the principal (or passenger) seats		Brougham. (With panel quarters) Limousine. (With quarter lights)	Single Landaulette Three-quarter Landaulette. (With quarter lights)	Single Cabriolet Three-quarter Cabriolet. (With quarter lights)
All inclosed with partition at back of driver		Inclosed Limousine. (Partition behind driver)	Inclosed Landaulette	Inclosed Cabriolet

Better Service Can Be Obtained by Making Maintenance Pay

Factory promotion material should emphasize possibilities for profit. Dealers usually consider repair shop an expense. Likely to give it more attention if manufacturers show them how to make money by so doing. Car sales appeal is indirect.

By Donald D. Blanchard

GREATER car sales through better service is the basic idea around which factory service promotion among dealers has centered. This angle of approach is the obvious one for the manufacturer to adopt, as his profits are dependent on car sales. But the results obtained with promotion of this character have not been entirely satisfactory. Factory service executives admit that there is much to be done before dealers generally will be providing the service to which owners are entitled.

This condition suggests that a better angle of approach might be used. Perhaps if factory service promotion devoted itself to showing dealers how to make their service profitable it would be more effective. If factories can put dealer service stations on a paying basis the desired improvement would be effected, for experience has shown that profitable service stations give good service.

A surprisingly small percentage of dealer service stations are operating at a profit. Proof of this statement is not hard to obtain. Ask the dealers in any community how their service stations are making out and most of them will say that they are operating them at a loss. Occasionally a dealer will say that he is breaking even, and once in a while one will say that he is making a profit. Since this is the situation, it is not hard to understand why so many dealers are not fulfilling their service responsibilities.

Dealers frequently regard loss incurred by the service department as an expense of the business and, as in the case of other expenses, they endeavor to reduce it to a minimum. In effecting this reduction, the quality of service usually suffers. The only reason they make any pretense of giving service is that they think it helps them sell new cars. Many of them are frank to say that they would gladly dispense with this department if it were possible.

As long as dealers have this attitude toward their service departments a high quality of service will not be provided. The attitude will persist as long as service departments are operated at a loss and factories will continue to encounter strong resistance to their service promotion work.

A FUNDAMENTAL weakness exists in factory promotion that seeks to improve service by telling dealers that it will sell more cars. The appeal is indirect. Dealers are interested chiefly in making profits directly. They usually operate repair shops at a loss and consequently do not give them the attention needed.

Why not make the appeal: "Make More Profit by Selling More Service and Better Service." That appeal speaks the language of the dealer. He will react favorably to it because he regards service department losses as an expense, and endeavors to reduce it to a minimum. In reducing his "expense" he limits the quality of his service.

Profitable service stations give good service.

To get dealers to give the kind of service that makes satisfied owners, they must be shown how to make their service departments profitable. Emphasis must be shifted from car sales to service station profits. And there are profits in service, because the independent repair-shop is able to support itself on the income it derives from this source.

Some factory executives, perhaps, do not think service should be a source of profit. Of course, if a car is defective in some respect, it should be made good without cost to the owner, but repairs, replacements and adjustments made necessary by wear and tear on the car should be paid for by the owner. The dealer has a right to a profit on such service sales just as much as on any other sales.

The writer was present recently at a meeting of factory men which was addressed by the manager of a dealer business in a large city. The manager was describing some of his service station methods and mentioned that he expected to put in a bonus system for his service salesmen, the idea being that they could increase their earnings by increasing their sales. One of the factory men asked if that would not result in the service salesmen making an effort to sell service which the customer did not need. The speaker replied, "It might, but I can't resist the temptation to make my service station pay a profit." This is not a radical viewpoint, as all dealers are desirous of securing the same end.

THE factory can help the dealer sell his service; it can help him with the internal management of his service station; and it can help him with his accounting and cost keeping work. It can show him how to get business, how to do the work and how to charge for it.

The first step in a campaign to make service stations profitable should be aimed at both dealer and owner. Each one should be given a more definite understanding of what should be free and what should be paid for. The owner should be made to understand that the warranty on his car covers defects only, and the cost of

making repairs, replacements and adjustments caused by ordinary wear and tear, is one of the expenses of automobile operation. Dealers should be impressed with importance of differentiating between free service and service that should be paid for. They should be urged to make this distinction and to sell its fairness to their customers. Automobile owners have been led to expect more service than they have a right to, and it is the duty of both dealers and factories to correct this situation.

FACTORIES generally are supporting the flat rate method of charging for service labor, and its use is spreading rapidly. It will doubtless help to draw business to dealers' service stations and it has the further advantage of making the operating force more efficient, since it places a time limit on each job. The piece work system of paying service station mechanics is also spreading rapidly and is likely to come into general use. It guarantees the labor cost of jobs sold on the flat rate. Dealers need information on this subject, as it will help make their shops more profitable.

Special tools will reduce the cost of service to the owner and the cost of doing the work to the dealer. Factories can assist in the development of service tools and equipment, and can promote their use among their dealers. It has been predicted that in the future when a new car is designed a complete set of special tools will be constructed to service it.

Dealers need service selling information. Their shops must have a steady volume of trade to be profitable. In the slack seasons they need service sales letters and advertising copy that will bring owners in with their cars. They need information on methods of handling customers and of selling service. In short, there is more need for service sales information than there is for car sales data. If service stations are to earn a profit, dealers must know how to keep them busy.

Accounting and cost keeping is another field in which factories can help their dealers. Many dealers lose considerable money, for example, through failure to charge for all material going into cars being repaired. They make mistakes in purchasing parts and do not get the proper turnover. Factory service departments should help them select stocks which will produce turnover and profits. Factories have men who are experienced in time study and costing work, and their knowledge might be used to help dealers determine costs in service stations so that service could be charged for on a logical and profitable basis. Many dealers need accounting information, as they are not making proper charges to other departments of their businesses, nor are they distributing their expenses as they should.

These are just a few of the things that factories can do to help their dealers make their service stations more profitable. Such educational work will give dealers a new outlook on service. It will make them see this department of their businesses a productive unit and not as a source of loss. They will be interested in service as a profit maker, will want to do more maintenance work, and to do it more efficiently and more economically than in the past.

THIS is a real job for the factory service department and one that, if successfully accomplished, will lift it up on a par with the car sales department. Occasional inspirational letters telling dealers to give good service so that they can sell more cars, technical bulletins and parts selling letters will not make dealers give better service. The factory service department that will devote itself to showing dealers how to make service profitable is much more likely to have its efforts crowned with success.

Dealers generally are not giving good service because they have not been shown how to make money directly by so doing. Only the indirect route through car sales has been pointed out to them. They have tried selling service for less than it costs and have found that it does not work, just as they have in the case of used cars. Some dealers have found it possible to make service pay, just as some have avoided used car losses. And experience shows that:

Profitable service stations give good service.

Two Concerns Place New Equipment on Market

A LUBRICATING spring cover featuring a metal sealed joint instead of the conventional lacing has been placed on the market by the Albe Mfg. Co. The construction of this cover is as follows: A metal strip lying along the bottom of the spring forms a base for a series of vertical tabs. One side of the fabric cover, which is made of heavy artificial grain leather, is held by these tabs. The fabric is drawn around the springs, leaving sufficient room for lubricant and spring action, and the tabs are forced through the other edge of the fabric.

The spring clips are covered as well and metal binders are drawn around both ends of the covers to make them tight. The fabric joint is sealed by covering with a japanned metal strip, punched to receive the tabs. The tabs are then bent down in alternate directions, thus holding the metal strips in place.

Lubrication is accomplished by removing a hexagonal plug and inserting any force feed system connection.

A PNEUMATIC bulb replaces the customary accelerator pedal in a throttle control device just brought out by the Motor Products Corp. This pneumatic accelerator employs compressed air in place of the usual rigid metal connection between the foot and the carbureter. The pressure of the bulb is transmitted by the air column to the carbureter through an air cushion under the steering column. As the foot pressure is increased, the air cushion expands, and, as the pressure is decreased, the air cushion contracts. This movement controls the action of the rod which leads to the carbureter, but does not interfere with the hand throttle.

The advantages claimed for the new accelerator are that it prevents the gasoline from being fed too rapidly and tends to eliminate the choking and bucking of the engine. It is also claimed that the cushioning properties of the air do away with fluctuation in the carbureter control resulting from jolting and bouncing of the foot as the car passes over inequalities in the road. The rubber bulb is movable and can be placed in a position to suit the convenience of the driver.

A VERY small aircraft engine, rated at only 18 hp., has been developed in England recently and is known as the Bristol Cherub. It is of the double cylinder opposed type and weighs about 85 lb.

It is suggested that an engine of this type opens up new possibilities in gliding, for it should be possible to construct a glider carrying such an engine which could be sailed over long distances without power and when the wind failed to sustain the machine, have the engine switched on to furnish the necessary power.

The FORUM

Balloon Tires Give Riding Comfort

Editor, AUTOMOTIVE INDUSTRIES:

I have been driving on 34 x 7 tires for almost a year, using these tires on a Packard Twin Six and a Cadillac Victoria. Have driven altogether about 15,000 miles, about two-thirds of which driving has been in the city and the balance over all kinds of country roads and state highways.

The first 34 x 7 tires I used were flat truck tread tires of ten and twelve ply construction. They weighed about 70 lb., including the tubes. Results obtained with these tires and 30 lb. of air pressure, while much more satisfactory than with the 33 x 5 and 35 x 5 tires previously used on the same cars, were not nearly as satisfactory as those obtained with the lighter tires which I am now using. The present tires are four ply construction with round tread and weigh, with the tubes, about 30 lb. I am carrying 28 lb. of air in front and 32 lb. in rear.

I never knew what riding comfort was until I began using my present tires and it has become very apparent to me that large section tires with low pressures present so many advantages that they will be in universal use before long.

It seems to me that the advent of the large section types makes it possible for the first time to get real benefit from pneumatic tires. With the 4-in. and 4½-in. section tires which have been used up to the present time, it is necessary to carry 60 lb. pressure on heavier cars. As a result, the tires are bounding and bouncing all over the unevenness of the road, lifting your car over all the obstructions, and causing no end of wear and tear to the running gear, practically all of which troubles are eliminated where large section tires absorb the unevenness.

Our garage records show that I am getting about 10 per cent better gasoline mileage with the large section tires than was obtained with the 5-in. tires formerly used. A large part of this saving, I believe, is due to the fact that it is not necessary to slow up for the rough places encountered while driving. In other words, I go along at a steadier pace and do not have to slow down to avoid the bumps, as is necessary with the smaller tires.

Skidding is practically eliminated with the large section tires. I never use chains on these tires and have not found them necessary. People riding with me on wet asphalt pavements marvel at my apparent recklessness until I demonstrate to them how quickly I can stop the car and be doing it without skidding. On wooden block pavements, which are extremely slippery when wet, the elimination of the tendency to skid is not quite so marked as on wet asphalt. In testing out the tires on the wet wooden block pavement I have allowed the car to skid into the curbs so hard that I was sure the Disteel wheels would be bent, but I found that due to the larger overhang of the tires beyond the rim line, there was a sufficient cushioning effect to save the wheels from becoming bent.

People frequently ask me if it is not more difficult to steer the car with the large-sized tires. While the car is moving no difference is noticed. Manipulating in close quarters steering is not quite so easy as with the smaller section tires. A small person weighing 125 lb. has no trouble in handling the car under any and all conditions.

C. H. FLINTERMANN,
Vice-President, Detroit Pressed Steel Co.

What Is Aim in Chill Casting?

Editor, AUTOMOTIVE INDUSTRIES:

Without yielding to anyone in my respect for the authors of the article on chill castings which appeared in the issue of May 3, I would submit that its reasoning is hardly sound and leads to no conclusion of practical value. A long series of experiments is indicated from the results of which the conclusion is drawn that a test bar poured into a cold chill is liable to be porous in the center. From this it is argued that the casting operations should be doctored up so that test bars (not commercial castings) shall yield the most meritorious results.

A more reasonable conclusion to be drawn from the experiments is that the chill cast bar is a most unsatisfactory means for testing aluminum alloys, that the unavoidable variations in chill temperature and methods of pouring will lead to results far less consistent than those from a bar cast in a green-sand mold.

Without intimating that a commercial casting will have the same physical properties as a test coupon, it is surely taking a step in the wrong direction to pour such coupons under the carefully controlled conditions outlined which are totally unapplicable to a production job and which yield a resulting bar far and away better than any commercial casting can be. Clearly it is impracticable to design a mold, for example, for a piston in which the thickness shall everywhere be three times that of the casting, or to tilt at the angle indicated and pour at the rate assumed. Perhaps I am mistaken, however. Does the article aim at the production of good test bars or of good castings?

ERNEST V. PANNELL,
New York, N. Y.

Edsel Ford Comments on Balloon Tires

Editor, AUTOMOTIVE INDUSTRIES:

I have given these large section tires a try-out on my personal car and our engineering department has several sets running at the present time.

So far the results have been most interesting. While steering and handling at high speeds have been impaired to a certain degree, the better riding qualities have more than offset the above mentioned faults.

These tires are carried at approximately 30 lb. pressure and are constructed with a very thin side wall.

We are at the present time testing for the life of the tire, but have not made any definite determination as yet.

EDSEL FORD,
President, Ford Motor Co.

Precedent of Small Use in Predicting Future of Automotive Industry

Period of stabilization not yet reached. Relation of business to economic conditions changing. Small fluctuations of growing importance. Closer analysis of marketing methods needed. Better provision necessary for future service and maintenance demands.

By Harry Tipper

PROBLEMS involved in the automotive industry are not exactly similar to those in any other large lines of business. In the last few weeks a good many analogies have been drawn between the automobile and the steel business and also with other basic industries. These analogies, however, are very imperfect because the factors entering into the economic status of these industries are different than those which determine conditions in the automotive field.

While it is true that every line of business is affected by general economic conditions the effect of business changes is entirely different in various lines, particularly in the speed with which each reacts to economic changes.

Rapid growth of the automotive industry to a commanding position has not permitted it to develop a high degree of sensitiveness to general economic conditions. Nothing exists in the past which will indicate the fluctuations likely to occur in the future as the business stabilizes itself. This means that precedent will not be of much importance as analysis of the business itself and the factors which differentiate it from other fields.

The automotive industry has been creative from the very beginning. It has used the regular operations of industry only to a limited extent in the development of its program. In manufacturing it has created more development than it has transferred. In distribution it has been obliged to build its own methods almost in entirety. The time involved has been too short for the full effect of these tendencies to be visible. Many trends existing at present are not necessarily permanent; in fact, the very size and nature of the business indicates that some of these must pass out in the course of stabilization.

The relation between the volume of new business and the money value of the replacement and maintenance business is constantly changing. This variable relation will have its effect upon the entire distribution development and upon the relation between the new car sales and the other possibilities involved. The number of first-time buyers is decreasing relatively and this change involves a change in the sensitiveness of the business to outside economic conditions. The proportion of credit sales is also increasing. This will have a considerable bearing upon the relation of sales conditions in this business to the general buying position.

Factors Not Sufficiently Studied

Sufficient attempt has not yet been made to study these factors in their changing relation to one another, although such study is obviously important to the manufacturer who desires to run his business with continuous profit and minimum fluctuation.

There is a general feeling that peak production will continue only for a limited period, but that there will be a good business ahead for a long time. This is probably a correct estimate in a general sense. As the peak production drops off, profit will depend upon smaller differences in the actual movement of production and marketing. This smaller margin will demand a much closer analysis of the marketing problem in order to maintain the profit in the face of the economic changes, which are always occurring to a greater or lesser extent.

Vital Effect of Economic Changes

The present enormous size of the business and the ramifications of its distribution necessarily offers opportunity for continuance of large business and, at the same time, subjects the industry to the effect of general economic changes more definitely. Up to the present time, very little attention has been paid to the factors of change and their relation to each other. No particular importance has been attached to the difficulties of the retailer, to the fluctuations in the retailing field, and the dealer's short experience in dealing with the necessities of this business. Up to the present time, analysis of maintenance and service requirements has not been carried sufficiently far to provide ground-work for future policy. Problems of the moment have been tackled with considerable activity and with a fair degree of success. There is little evidence, however, that these problems have been considered adequately as regards their future tendency and necessity.

The effect of the complete identification of the manufacturer with the ultimate market and use, conditioned upon the flow of credit from the individual purchaser to the factory, has not been thoroughly considered as a new factor in large transactions. No other big business is subject to so complete or immediate a reaction from the individual user, and, therefore, there is no precedent from which the effects of such reaction can be determined.

While every other large line of business depends upon credit to the same degree, credit usually is broken and averaged at many points.

In the automotive field credit requirements are segregated sufficiently within the industry to have a pretty practical and definite bearing from the user to the manufacturing establishments. This also is without precedent in any business of similar volume and it introduces new factors which will have their effect upon the speed and character of the economic reaction.

A mechanical service of such proportions makes for substantial uniformity in the arrangements needed for maintenance and service. On the other hand, this is the first time that a complicated mechanical service has been subject to the desires of the individual users. These desires may be affected by social requirements of surround-

ing conditions and values arising out of general social life. Such elements in the buying do not make for entire mechanical uniformity. They have not been visible in any other complicated mechanical service, because there has been no definite line of identification between the manufacturer and the ultimate user. Conditions of use have been entirely different. There is, undoubtedly, a style element in automobile buying, but analysis must determine its effect, the extent to which it is likely to go, and the limitations of its demands. The presence of these new factors as the business stabilizes, indicates the need for closer analysis of the market itself, if the manufacturer is to take advantage of all the possibilities and, at the same time, minimize the difficulties that must be encountered.

This kind of analysis must involve more than a consideration of economic factors. It is subject to examinations of a much broader character, much more difficult to evaluate, where opinions are likely to be based upon a very much slimmer foundation of fact, and where opinions may be accepted without an examination of the fact basis. It is somewhat interesting to note that in law we are perfectly willing to accept the opinion of the lawyer because he is studying the matter. In engineering or manufacturing activities, we expect to go ahead on the advice of the expert, but, in marketing, opinions are asked and expressed with little or no consideration of the study and analysis preceding the opinion or justifying its expression.

This is particularly interesting because the proper assembly of marketing factors and their relation with economic conditions is more difficult on account of the variation in the factors and the difficulty of evaluating them properly. They rest upon human activity which cannot be determined either mathematically or mechanically. This does not eliminate the necessity for analysis but makes analysis much more difficult because few men have properly studied these changing factors of the market. Therefore, few men are in a position to place the proper value on the different factors.

Specifications of Magnets Limited by Knowledge of Subject

IN a communication to *Engineering*, G. L. Watson of M-L Magneto Syndicate, Ltd., says that permanence (of magnets) is a thing of which little is known, the probable reason being that it is very difficult to separate the diminution in flux which represents the true permanence from that which is due to the influence of demagnetizing forces.

If we take a piece of steel forming a closed magnetic circuit, and magnetize it, we shall, after removal of the magnetizing force, be left with that steel carrying a flux equivalent to the remanence of the material. If now we apply a demagnetizing force, either by means of an electric current or by introducing a gap in the circuit, we shall reduce the flux density to some lower value. The amount of reduction which occurs is in no way a measure of the true permanence of the magnet, but is simply a function of the coercive force.

If we now take the magnet in this condition and subject it to vibration or to small cyclic changes of temperature, insufficient in magnitude to cause any change in the metallurgical structure of the material, or if we leave the magnet standing for many months, or years, we shall probably obtain a further slight reduction in flux density, and this additional reduction is a function of the true permanence or stability of the material under the given conditions of demagnetizing force. Our present knowledge of the true permanence is too scanty to enable us to express accurately its relation to the other properties of a magnet, much less to lay it down in a specification intended for magnet uses.

As regards the phenomenon of magnetic elasticity or the amount of flux which reappears when a given demagnetizing force is removed this is of some importance when a magnet is used in an apparatus such as a magneto, where the demagnetizing force undergoes cyclic variations.

At the same time taking magnets as they stand at present the value of this "recovered flux" expressed as a fraction of the flux density at the point of BH max. varies so little between different steels that it may for practical purposes be neglected, particularly when we remember that the associated cyclic change in the magnet itself is in the case of the magneto so damped by the presence of eddy currents in the steel as to be of little or no value.

What the user of a permanent magnet requires to know is, firstly, how much energy he can obtain in his external circuit for a given outlay of money, and secondly, what will be the form which the magnet must take, *i. e.*, must it be long and thin, or short and fat. The value of $\beta\ \phi$ max., and the value of H at which this occurs, will put him in the possession of all this information.

It might be argued that not only will the user require this information, but that he will also want to know what further flux reduction will ensue should the magnet be submitted to a momentary overload, *i. e.*, he will want to know the shape of the BH curve at the point of $\beta\ \phi$ max. What he really requires, however, is the ratio of percentage decrease in H, or in symbols the value of—

$$\frac{dB}{B} \div \frac{dH}{H}$$

at the point in question.

The value of this quality for all present-day magnet steels which have been properly hardened is to all intents and purposes a constant, or at all events, any error in composition or heat treatment, sufficient seriously to affect this ratio, would at once cause the $\beta\ \phi$ max. to be lessened to such an extent as to cause rejection of the steel.

In the present state of our knowledge of permanent magnets any specification should be confined to laying down the value of $\beta\ \phi$ max. with its associated value of H, the tolerance allowed being such as to insure that all magnets complying with the specification give equal results in a properly designed apparatus.

Advertising Practice Presented

MANUFACTURERS' advertising addressed to retailers, its peculiarities and importance in building trade cooperation, are well presented in a recent volume by R. L. Burdick, published by the Ronald Press.

In "Advertising to Retailers" Burdick treats all questions pertaining to planning and layout of advertising matter. The distinction between the approach required to reach most successfully the consumer and retailer market is carefully analyzed and numerous examples press home each point.

Readers of this work will get an insight into the basic principles and best practices of advertising in this field and will find the information readily applicable.

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Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
David Beecroft, Directing Editor
U. P. C. Building, 239 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
James Dalton, Editor
Norman G. Shidle, Managing Editor
P. M. Heldt, Engineering Editor
Herbert Chase, Engineering Editor

DETROIT OFFICE
J. Edward Schipper

WASHINGTON OFFICE
26 Jackson Place, N. W.

BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—317 Fort Street, West, Phone Main 1351
Cleveland—538-540 Guardian Bldg., Phone Main 6432
Philadelphia—1420-1422 Widener Bldg., Phone Locust 5189
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New Models and Price Revisions

GOOD fortune has crowned the efforts of the industry to come into the summer season without a general increase in prices. Much restraint was exercised in withstanding temptation in the face of rising manufacturing costs and shrinking profits, but it was worth while.

The public will not soon forget that the automotive industry was practically the only one which kept its prices on virtually the same level for nearly eighteen months when it would have been easy to find justification to increasing them.

Trade circles generally have accepted the theory that lists will not be changed now until the new models begin to come out late in July or early in August. There probably will be a wide revision at that time and the trend will be upward.

Most of the new models will embody more than the usual number of changes, however, and many of them will be of unusual importance. Not a few, such as the four-wheel brakes which will be installed in several cases, are relatively expensive and will make necessary a somewhat higher price.

Inasmuch as the new lines will give buyers greater values, little resistance to the new prices need be expected, however, for the additions will little more than cover increased production costs. In general, price advances will be greater on open than on closed models.

Present prices on the open lines were based on the expectation that very large output would be maintained. Inasmuch as the percentage of closed cars will be raised as rapidly as possible, it will be only logical that the cost of open models should go up.

Manufacturers will be wise if they offer their closed cars at the lowest price compatible with a reasonable profit because the lower they are the wider will be the market.

Saving Weight to Reduce Cost

SINCE the cost of most automotive vehicles is very largely that of materials—some put the percentage as high as 90—it is worthwhile to consider how material cost can be lowered.

One evident means is by saving in weight wherever possible. One need only make a study of large production cars to find that this item has been given considerable attention. It is not difficult to find cases, however, where much weight could be eliminated simply by taking advantage of modern methods of construction or by minor changes in the design of forged, rolled and stamped parts as well as in castings. Such savings must, of course, be made in the unfinished stock, and in reduction of waste, else the bill for materials is not lowered. Saving weight by use of a lighter material is sometimes an economy even if the cost per pound is greater.

Other possibilities of weight reduction exist, however, both through new methods of heat treating or better application of old methods and through such developments as the large section, thin wall tire which may make possible some radical changes in the design of parts, heretofore been kept heavy largely to minimize failure due to road shock. The lower inflation pressure, which is a feature of the new type of tire, makes it a far better shock absorber and may well enable the use of lighter chassis construction than was ever before considered feasible. It is still too early to make definite predictions along this line, but the developments which appear to be possible should not be overlooked by those who appreciate the advantages of light weight.

Other things being equal weight reductions result in additional economies besides lower first cost, but it must be borne in mind that lowering weight does not always reduce first cost, especially if the reduction involves the use of higher priced materials or more machine operations.

If, on the other hand, less material can be made to do the same work without a corresponding increase in labor cost a substantial saving is effected.

Plant Facilities Need Readjustment to Supply Steady Demand for Closed Body Models

AUTOMOBILE manufacturers who have felt that the trend toward closed models might be more or less transitory and confined chiefly to the larger cities, probably will have to revise their estimates. Evidence is accumulating that the demand for closed jobs is steadily expanding and will continue to do so. Open cars are not likely to disappear entirely, but it is becoming apparent that sooner or later they will make up only a fraction of the total in large sections of the country.

The reason is not hard to find. Until the price differential between the two classes went down sharply, the closed model was regarded as something which only the rich could afford. Now that it is possible to buy a perfectly good coupe or sedan for only a few hundred dollars more than a phaeton costs, almost every one who can afford any kind of an automobile wants one that is inclosed.

If it were only a whim of fashion, the demand might be somewhat ephemeral, but the liking for closed cars has a substantial basis. All the year round use of automobiles is steadily increasing. Highways are better and snow-removal campaigns are making consistent progress in most of the Northern States. There are few cities in which the main streets are not always clear of snow.

Only the hardiest of drivers will venture out in an open car in cold weather unless the necessity is great, but a closed model is perfectly comfortable in fall, winter and early spring and it has its advantages in summer. Even those who like a phaeton best five months of the year have found that protection from wintry blasts the other seven months is much to be desired.

It is the business of the industry to supply the public with what it wants, but it will involve at least two difficult problems. One is the ever present and generally acute used-car problem. Many thousands of persons who own open cars in excellent condition and often practically new, are eager to trade them in for closed cars on almost any basis. Dealers are having little difficulty in getting rid of used closed cars but demand is relatively light for used open models even when they are in the best of condition and offered for sale at a ridiculously low price.

This condition promises to become more and more acute as the year advances. Used cars and limitations of closed car production capacity are likely to determine the volume of business rather than the demand of prospective buyers. The situation is one which cannot easily be forced. When the public wants closed cars nothing is to be gained by trying to force it to buy open models.

Such a procedure would add seriously to dealer difficulties, already heavy enough with used cars piling up. It also would be rather profitless for manufacturers who already are working on a close margin of profit on their open jobs. If they raise prices sales resistance for this type will be increased.

The other serious problem involved is somewhat less immediate, but even more important in the long run. The production facilities of the industry have been based largely upon the theory that there always would be a big demand for open cars and a relatively small one for closed models. This theory must now be revised. Output of coupes and sedans has been limited for the past two years only by production capacity.

Hectic efforts have been made to enlarge the output of closed bodies, but present manufacturing facilities and the supply of needed materials have been inadequate. Quantity production on closed models is more difficult than on open. Some companies have had difficulties because of the speed with which closed bodies have been rushed through.

We have pointed out repeatedly the dangers of undue plant expansion. The present capacity probably is adequate to the needs of the industry for some time to come, but it needs readjustment and revision. The country wants more closed cars than it is getting, but it is quite possible many manufacturers might not be justified at this time in building their own body factories. There are in the country, however, hundreds of small body plants which probably are not operating at capacity. A large proportion of them are equipped to turn out good work in fairly large quantities and there are many more which easily can be equipped.

Analysis of the situation indicates that now is the time for the body maker with something to sell to search out the car manufacturer who must expand his sources of supply or lose a part of his market.

J. D.

Milton Again Wins at Indianapolis

His H.C.S. Special Bears Miller Engine

Durant Specials, Also Equipped with Millers, Run Second, Third and Fourth

INDIANAPOLIS, May 30—When Tommy Milton drove to victory in the H. C. S. Special in the eleventh annual 500-mile race on the local speedway today he was acclaimed the popular hero, but there were honors in this classic to be shared with other men whose names are familiar to followers of automobile racing. It will not be detracting from Milton's credit to name the others.

Milton drove a great race, holding the lead most of the time. He took $9,600 in lap prizes in addition to the grand prize of $20,000. His time was announced as 5 hr. 28 min. 6:27 sec., an average of 92.44 m.p.h. This time was rather faster than was generally expected. It compares with 94.48 m.p.h. last year and is the fastest time except the 1922 record.

Milton's victory was notable for several reasons. He is the first driver to come back as a winner. He drove a Frontenac to victory in 1921. That year his car had a displacement of 182.5 cu. in., and his average was 89.62 m.p.h. In 1922 Milton did not finish. He was third in 1920.

The men with whom Milton must share the honors are Harry C. Stutz, the Indianapolis car manufacturer, who entered the race field only a few days ago, when he bought two Miller cars and re-christened them H. C. S. Specials.

Harry Miller Big Figure

The big figure is Harry Miller, the Los Angeles race car specialist, the first man who has ever properly merchandised the race car. Miller entered eleven cars in this race and six of them finished. Twenty-four cars started, and only eleven finished. This makes a very good record for Miller.

Taking the cars by teams, Durant carried off the honors. Durant entered seven cars and five of them finished. Car 29 went through the fence in the only serious accident of the day in the twenty-second lap. Car 26 went out with a broken gas tank.

The Mercedes team had three, and two finished. Car 14 hit the wall in the sixteenth lap and the mechanic was slightly hurt. The other two made the most noise of any cars on the track and had a "hard" sound. In addition the superchargers added a whistle that sounded like a half worn muffler on a New York Charabanc. These cars suffered greatly from preignition during the latter part of the race but proved their sturdiness by not going to pieces under the strain. The driving of the German team was much criticized, both as to unfamiliarity with the track and a lack of team work.

The Bugatti team started with five cars and finished with one in the race. These cars were quite impressive in appearance. Three of them went out be-

(*Continued on page* 1199)

Business in Brief

NEW YORK, May 31—Trade and industry has shown a spotty condition during the past week but there is a tendency to play up the favorable aspects of the situation. The slowing up in the industrial pace is most notable in the building trades. There is also a maintained reduced pace in cotton manufacturing.

Reports from the agricultural centers prove that the season as a whole is delayed. Grain crops are showing improvement due to the heavy rains while the cotton crop has lost through the same agency.

The magnitude of the freight movement, reflecting the industrial pace, has shown no diminution. Iron and steel production continues at the highest level on record. The policy of forward buying in this line shows increased conservatism. Coal output continues to show a heavy volume.

Freight car loadings for the week ending May 12 aggregated 974,531, an increase of 13,052 cars over the previous week. The loadings for this week are the highest yet for the year 1923.

Signs of recession in numerous lines are beginning to be taken as omens of industrial health. It is thought generally that such recessions were needed and now that they have been brought about a firmer foundation has been laid from which to make further advances.

After heavy declines the stock market has shown a decided rally and become strong for the first time in many weeks. Bonds have shown a much better demand and at rising prices.

Tire Builders Deny Big Surplus Report

Also Scout Idea of Retrenchment and Rumor of Likely Shutdown in July

AKRON, May 29—A census of the Akron rubber companies, including twelve within the city of Akron itself, shows that Akron produced an average of 102,000 tires a day during May. The Goodyear company is running 32,000 tires a day in Akron and about 40,000 in all its factories, including Akron, Canada and California.

Firestone continues at a pace of 30,000 a day with Goodrich turning out in excess of 20,000 a day, Miller over 8000 daily and General approximately 4000 a day. The Seiberling Rubber Co. is steadily increasing output and soon expects to have a ticket calling for 2500 casings a day. The six smaller companies are making an aggregate of about 5500 tires a day.

The Goodyear company set a new record for a thirty day production with a total of 1,029,797 tires turned out by all its factories during April. The month's production figure was boosted by the special effort made in all plants on Friday, April 13, when the Goodyear factories in twenty-four hours' time manufactured 64,013 tires. Of this number 48,953 were made in the Akron plant alone.

No Abnormal Unemployment

When the slackening of production begins, some of the Akron factories will probably lay off a few men while others will shorten shifts. But there is no abnormal unemployment in Akron today, and what few men are leaving the tire factories are finding other jobs readily.

While there are indications of a probable slight tapering off in tire output between now and the first of July, no abnormal overproduction of tires is evident at the present time, and there seems to be little to substantiate the belief that a serious slump, which may entail the almost complete shutdown of some tire factories in the United States, impends for the industry.

Tire manufacturers in the Akron district are united in expressing the opinion that the industry will go through the customary dull season of sales without any appreciable slowing down of manufacturing activities, while they are also united in regarding as extremely unfortunate the rumors extant principally throughout the East, to the effect that

(*Continued on page* 1207)

British "Deemster" Will Be Built Here

Maker Will Satisfy English Demand First—Locates in Pennsylvania

NEW YORK, May 29—Organization of the Deemster Corp. of America under the Delaware laws has been perfected and a plant at Hazleton, Pa., purchased for the purpose of manufacturing Deemster cars in this country to supply English needs first before going after American business.

The organization plans were completed this week following the arrival from England of George F. Summers, president of the Ogston Motor Co., Ltd., which manufactures the Deemster car at Acton, England.

Summers has organized the new company because of the inability of his English factory to turn out enough cars to supply the demand for Deemsters abroad. The capacity of the Acton plant is about 2000 cars yearly, while the demand is for 8000 to 10,000. Therefore Summers has turned to this country for relief, believing that it will be possible to build Deemster cars here for the English market at a saving of 50 per cent, including duty.

Julius Keller President

The Deemster Corp. of America is capitalized at $1,000,000 7 per cent preferred cumulative stock and 50,000 shares of no par common. Julius Keller, Jr., of Philadelphia, consulting mechanical engineer, who has spent the last three years in England, has been elected president. Summers is vice-president and M. Cohn of Cohn & Maffuci, public accountants of New York City, who have handled the financial details, is secretary and treasurer.

The company has secured the plant of the Worthington Pump Co. at Hazleton, located on 20 acres of land and with 218,000 sq. ft. floor space. It plans to take possession June 15 but will not be in production before Jan. 1. The output for the first year, 1924, will be 6000, of which 4800 will be shipped to England before any attempt is made to put the car on the American market. It will sell for under $1,000 in this country and at about $1,100 in England as compared with the present list of $1,600 on the British product. The American company will supply all markets outside of the British Empire.

Differs from English Job

The car which will be built at Hazleton is a 14 h.p. four-cylinder job with 2.95 x 4.02 bore and stroke. The engine has an overhead camshaft, three ball bearing crankshaft, with oil fed through a vertical camshaft drive to the valve mechanism. The engine, it is said, is capable of turning over at 5500 r.p.m.

The wheelbase is 110 in. and the tread 50 in., while the tires are 30 x 3½ clinchers. It is claimed the fuel consumption averages between 35 and 40 miles per gallon. A Zenith carbureter is used. The company will make all of its own parts at the Hazleton plant. The English Deemster has 96-in. wheelbase, 48-in. tread and 28 x 3½ tires.

Summers has been president of the English company for the last eight months, going to that concern from Germany where he built a car of his own which was known as the Hornsted in England and the Moll in Germany. His associate, Keller, was prominent during the war as a member of the firm of Keller Engineering & Sales Service.

Farm Sales Will Prove Big Factor in Business for Last Half of This Year

By COLIN CAMPBELL,
General Sales Manager of the Chevrolet Motor Co.

Detroit, May 29.

GENERAL conditions in the United Staees today are such as to assure a continuance of good business indefinitely unless there is a complete change in the mental attitude of the purchasing public. It has always been my opinion that if enough persons can continue to talk depression long enough they can succeed in bringing about at least a temporary check to what might otherwise be a continuously prospering period. From our standpoint everything is sunshine and I see no reason to attempt to picture future conditions in anything other than from the bright side.

If the American farmer continues along in his present frame of mind, and has reasonable good fortune in the harvesting and marketing of his crops, he will make the automobile market, especially in the low priced field, fully as busy in the last half of the year as the first half has been.

The mental attitude of the farmer today is good and his financial position is steadily improving. Automobile sales in the farm districts of the Central West are increasing every month and have already reached a volume fully as large as was expected at this time of the year.

Southern conditions are improving all the time. North Carolina continues to hold a very favorable position and is proceeding extensively with the development of its highways. Bankers in Texas told me on one of my recent trips through that district that cotton growers have paid off practically the last outstanding obligations within the last sixty to ninety days and are free of debt. Normal cotton crops with prices even as low as fifteen will place these growers in better financial condition than they have been for years.

Though there is an increasing demand for closed cars all the time there is still a large market for open models and our distribution difficulty is just as serious with one type as with the other. There is an especially large demand for open cars from the Pacific Coast and from the South but there is a good general demand for the open types from all parts of the country. Though there is an always increasing movement toward the closed cars the open car will hold popularity with a large field of buyers for a long time.

In sales to the farm districts the open car will continue to hold first place but there will be an increase in the number of closed cars bought. Farmers today are more discerning in their tastes than fifteen or twenty years ago and want very much what the average city resident buys. The growing generations on the farms want the newer things and will buy them.

Used car conditions in the low priced field are very good and can have no effect upon business generally. Dealer stocks are so small that they are not worth considering. This indicates to us that a large part of the buying of the year to date has been by new owners and also that whatever trading was done, was on a basis favorable to quick resale by the dealer.

WILLS DETAILS COMPLETE

DETROIT, May 29—Details are reported completed for the taking over of the C. H. Wills & Co. property at Marysville by a new company to be headed by C. H. Wills, following the sales on next Wednesday.

Dare Aircraft Directors Ask Company Dissolution

DETROIT, May 29—The Dare Aircraft Co. has filed a petition asking for permission to dissolve the company following the failure of a three months' effort to sell stock in the concern. The company was organized last year and was granted authority to sell $500,000 worth of stock by the Michigan Securities Commission. It has been unable to sell enough of the stock to start on a paying basis and directors voted May 25 to dissolve.

The purpose of the company was to manufacture and operate light aircraft in commercial service, the factory to be in Detroit. Lines to nearby cities in the Great Lakes and Middle West district were to be operated. The company also planned a general distribution of its product to operating companies.

Liabilities of the company, which total about $8,000, will be cared for by the tangible assets.

Closed Car Demand Changes Schedules

Plant Facilities Shifting More and More from Production of Open Models

NEW YORK, May 28—There is no indication of a general curtailment of manufacturing schedules in the automobile industry. In the few instances where programs have been reduced, it has been due to the shifting of activities from open car production and their concentration on closed models, which take more time and labor for completion. This is placing plant operations at a lower figure than if facilities were devoted to a greater extent to open car output.

Factories as a rule are following April schedules, with a few of the major producers reporting record production. The 5 per cent increase over the first week in April noted in the operations for the same period in May was not sustained during the second week, but no falling below the previous month's level was reported by the industry as a whole. Passenger car production for the first five months of the year will closely approach the 1,500,000 mark, if it does not go beyond it.

Not Likely to Escape Decline

The usual falling off in sales and production, expected this month, may start in earnest in June. Sales conditions throughout the country are somewhat spotty at present, but there is nothing alarming in the situation. For months buying has been sustained at an exceptional rate and this year is not likely to escape the decline experienced in other years at this period.

Production facilities in many of the plants are being given over more and more to closed car output. The popularity of this type has gone far ahead of early estimates, resulting in a demand for the standard makes that is in excess of plant capacity. In some sections of the country dealers are stocked with open models which, it is believed, will be absorbed readily with more seasonable weather. The shortage of closed cars, however, is widespread.

Truck production is making conservative gains, maintaining a steady percentage of monthly increase over a year ago. During April the output of these vehicles aggregated 37,366 as against 22,342 in the same month of 1922, and for the four months of this year the total reached 113,182 compared with 64,714 for the like period a year ago. There will be a further movement forward in May, manufacturing schedules stepping up to keep pace with a wider demand.

Trucks are moving toward agricultural sections in greater volume, with excellent prospects for further sales based on the present outlook in wheat and cotton growing areas. These crops are being watched as having an intimate bearing on sales possibilities. Tractor production is being stimulated by improved farm conditions and continues to show wholesome development.

Parts makers report capacity activity with collection conditions remaining sound.

TAX RETURNS SHOW INCREASE IN APRIL

WASHINGTON, May 26—Figures compiled by the Bureau of Internal Revenue covering taxes collected on automobiles and motorcycles during April showed an increase of $1,243,830, as compared with the same month last year The increase in tax collections on automobile accessories for April, 1923, totaled $1,162,923.

The excise tax on motor trucks fell off $7,749.

The total collections for motor trucks in April, 1923, amounted to $712,805; automobiles and motorcycles, $5,620,550, and automobile accessories $3,394,126.

Huffman, Truck Builder, Buys Barton Axle Assets

ELKHART, IND., May 28—A group headed by L. R. Huffman of this city has purchased at auction the entire assets of the Barton Axle Co. of Barton, Wis.

The property of the Barton company, which had been in receivership for several months, includes twenty-seven acres with a new fireproof plant, equipped for the manufacture of the worm drive type of truck axles, a large inventory of raw and finished materials and fifteen residence buildings for housing executives and employees. The cost value of the property is said to be $375,000.

The Huffman group has not indicated what its intentions are with reference to the purchase other than to state that it is a step in plans relating to another concern in which it is interested, the Huffman Brothers Motor Co. of this city, maker of Huffman passenger cars and trucks.

CADILLAC SALONS HELD

DETROIT, May 26—Cadillac Motor Car Co. will hold a special salon in many cities of the country during the week of May 28 to June 3.

Parts Bookings Run Solid Up to June 15

Some Plants in Milwaukee District Assured Capacity Operations Until July 1

MILWAUKEE, May 28—While it is a development not particularly significant at this time each year, yet some comment is made in the automotive units, parts and equipment industries that there is some recession in sales and forward orders. Makers are booked up solid to June 15, however, and some shops will require maximum capacity to July 1. Production is being maintained at peak in most cases, although labor losses and the inability to make quick replacement, owing to the shortage of workmen, has made it impossible to sustain output.

The change in the situation with regard to forward orders is a seasonal one, as almost invariably it occurs as July 1 approaches and schedules for the new production and merchandising year are under consideration. At present all lines of the automotive industries exhibit exceptional activity, and manufacturers of passenger cars especially are pressing for deliveries of units, parts and equipment. Jobbers' demand for equipment is still strong, although heavy deliveries in the past three to four months have made needs of stocks less urgent.

Delivery of Material Slow

Complaint is more frequent that deliveries of iron and steel to makers of units and parts are behind specifications, and delays in getting raw and semi-finished materials are beginning to affect production. Locally, gray and malleable iron and steel foundries are operating at maximum capacity without being able to gain on delivery specifications. The principal business is with automotive industries and the railroads.

So far as machine tool business is concerned, the call from automotive shops is declining, and railroad business is steadily becoming the principal source of sales. Automotive shops have been heavy buyers of metal-working machinery for the past year, and it was expected that, with the bulk of requirements for the present filled, trade from this source would go on a replacement basis or scattering sales to piece out equipment.

BATTERY MAKER REORGANIZES

CINCINNATI, May 29—The Cincinnati Storage Battery Co. has been reorganized through new interests buying out the holdings of Albert H. Luhrman. A. D. Bullock has been chosen president; James P. Orr, vice-president and W. T. Foley, secretary and treasurer. In addition to the officers the directors are James W. Bullock, Charles W. Ireland and O. A. Bullock.

Parts Makers Break Earlier Sales Record

Total Business of M. A. M. A. Members in April Amounted to $61,647,050

NEW YORK, May 28—April returns show another record-breaking month for the parts branch of the industry, reports filed by members of the Motor and Accessory Manufacturers Association telling of an increase of 4 per cent in sales over March, which was the previous peak among the parts makers.

Total sales in April by members of the association amounted to $61,647,050 in comparison with $59,428,800 in March. This brings the total amount of business done in the first four months of 1923 to $125,046,500, as compared with $102,540,000 in the corresponding period of 1922.

There is little difference between March and April in the matter of collections, which continue good. Past due accounts show an increase of 8.5 per cent, the April total being $2,313,150, as against $2,129,350. Notes outstanding in April amounted to $1,839,350, compared with $1,929,300, a decrease of 5 per cent.

There is every indication, however, that both parts makers and car manufacturers are exercising conservatism in the latter days of May. No parts maker can be found with commitments for more than sixty days ahead, and the orders that are being placed now are reasonable and designed to meet only immediate needs.

Close buying seems to be the watchword of the purchasing agents, and the parts makers are cooperating with their customers to the limit, seeing that they get all the materials they need at the present time, but not being stampeded into recklessness by the record-breaking business of the first half of the present season.

BUSINESS OF M. A. M. A. MEMBERS INCREASED 4 PER CENT IN APRIL OVER MARCH

NEW YORK, May 28—Reports from members of the Motor and Accessory Manufacturers Association show that sales in April increased 4 per cent over the preceding month. Total purchases amounted to $61,647,050.

The following table shows the sales by members of the association, the total past due accounts and the totals of notes held for all of 1922 and the first four months of 1923:

1922	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$17,320,000	20.61 Inc.	$4,450,000	5.45 Inc.	$3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.70 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.
October	39,753,800	3.90 Inc.	3,463,850	17.93 Dec.	2,603,100	2.09 Dec.
November	36,616,850	5.51 Dec.	4,245,850	22.58 Inc.	2,442,700	6.15 Dec.
December	34,711,630	5.20 Dec.	3,494,850	17.69 Dec.	1,905,650	21.98 Dec.
1923						
January	45,451,950	30.94 Inc.	2,469,950	29.33 Dec.	1,945,850	2.11 Inc.
February	48,518.700	6.75 Inc.	2,741,100	10.82 Inc.	1,981,950	1.86 Inc.
March	59,428,800	22.49 Inc.	2,129,350	22.32 Dec.	1,929.300	2.66 Dec.
April	61,647,050	4.00 Inc.	2,313,150	8.05 Inc.	1,839,350	5.00 Dec.

Creditors Will Choose Trustee for Mitchell

MILWAUKEE, May 28—Creditors of the Mitchell Motors Co., Inc., Racine, Wis., have received notice that the first meeting to elect a trustee will be held Thursday, May 31, at 1.30 p.m., in the circuit court room in the courthouse at Racine. The creditors number 625 firms and individuals.

Schedules filed with Milton J. Knoblock, referee at Racine, by Herbert F. Johnson, who was named receiver upon the involuntary bankruptcy petition, reveal liabilities of $3,960,240, of which all but $24,908 is unsecured. The assets are appraised at $3,742,722.

Most of the liabilities consist of bank loans, merchandise claims being small in number as well as in amount.

The largest item of assets is finished and unfinished cars, appraised at $1,617,598. Real estate and buildings are valued at $980,896; machinery and equipment, $958,558; accounts receivable, $73,210; notes, $43,103, and unliquidated claims, $39,394.

Preston Motors Assets Reported as $766,917

BIRMINGHAM, ALA., May 28—A complete statement of the assets and liabilities of the Preston Motors Corp., recently thrown into involuntary bankruptcy, has been filed with the clerk of the Federal Court here.

The statement shows the total assets of the company as being $766,917 and the total liabilities as $185,516. A little more than $500,000 of the assets of the company are represented in the plant, equipment and real estate holdings.

Three creditors, claiming an indebtedness of $7,678, filed the petition for involuntary bankruptcy. The Export American Industries claimed $6,018; the Hildreath Varnish Co., $1,573, and the S. F. Hendricks Co., $86.

John S. Coxe of Birmingham is receiver.

Buick Motor Building Branch in Jacksonville

FLINT, MICH., May 28—The Buick Motor Co. will establish a branch at Jacksonville, Fla., so that owners there may have direct factory attention. The branch will in no manner affect the present Florida organization, except to render the local dealers prompter and more convenient cooperation. No re-allotment or curtailment of dealers' territory is contemplated.

The new building, now in course of construction, will be 105 ft. square, with a salesroom 85 x 30.

Sterling-Knight Co. Organized in Ohio

CLEVELAND, May 28—The Sterling-Knight Co. of Warren, Ohio, has been organized and financed to take over the business of the Sterling-Knight Motor Co. of Cleveland, which has been carrying on the experimental work leading up to the introduction of the Sterling-Knight, designed by J. G. Sterling.

The new company starts with a capital of $1,500,000, of which $1,200,000 is in preferred stock at $100 par, $200,000 in bonds and 60,000 shares of no par common. In the new company are practically the same men who launched the enterprise originally.

The new organization has purchased the plant of the Supreme Motor Co. at Warren, including all engine building equipment. The plant comprises thirty-two acres of manufacturing site and two modern manufacturing buildings, approximately 400 x 100 ft. These buildings are equipped with the most modern machinery.

Production is to start immediately, and it is expected that deliveries will begin early in August. The line will consist of both closed and open jobs, with the standard five-passenger phaeton listing at around $2,000.

DENBY STOCKHOLDERS TO MEET

DETROIT, May 25—Stockholders of the Denby Motor Truck Co., which has been taken over by the Denby Motor Truck Corp., are being notified that a special stockholders' meeting will be held June 14, to act upon the directors' resolution that the old company be dissolved. The procedure is to wind up the affairs of the old company in conformity with Delaware legal requirements.

Haynes Stockholders Approve Merger Plan

Proposed Consolidation Into $10,000,000 Corporation Moves Forward

KOKOMO, IND., May 28—Stockholders of the Haynes Automobile Co. have formally approved the proposed merger with the Winton Co. of Cleveland and the Dorris Motor Car Co. of St. Louis into the Consolidated Motors Corp.

As announced here, the Consolidated corporation will be organized in Delaware for $19,000,000. It is expected that headquarters will be in Kokomo.

Explaining the Haynes position, Alton G. Seiberling, vice-president and general manager, states that the step is being taken to secure additional capital with which to manufacture automobiles on a quantity production basis. At the annual Haynes meeting in March the stockholders were informed of the plans and directed the board to take whatever action was deemed advisable toward refinancing the concern.

Stockholders Adopt Resolutions

A resolution adopted by the stockholders authorized the board as follows:

"To enter into and carry out the proposed reorganization and refinancing of the company along the lines proposed in the proposition made by Consolidated Motors Corp., a Delaware corporation, to the board of directors of this company, which provides for the refinancing of the company, the payment of its serial note and bank indebtedness and the assumption of all other debts;

And provides also for the transfer of all assets of this corporation to said Delaware corporation and further provides all accrued dividends to and including the dividend falling due June 1, 1923, and 25 per cent of the par value of said preferred stock in cash and the exchange of the remainder of said preferred stock for common stock in said Delware corporation at the ratio of three and three-fourths of common stock of said Delaware corporation for share of said preferred stock and also for the exchange of common stock of this company for common stock in the Delaware corporation upon a ratio of five shares of common stock of said Delaware corporation for one share of stock of this company;

And be it further resolved that the board of directors may make such changes, modifications and other provisions as may be necessary to carry out the general purpose of the said proposition."

Dorris Directors Approve

ST. LOUIS, May 28—Directors of the Dorris Motor Car Co. today decided to call a meeting of stockholders and recommend that the company enter the proposed merger with the Haynes Automobile Co. and Winton Co.

BIGGER FORD OUTPUT IN 1924

DETROIT, May 28—Interviewed as to the presidential ambitions by the *Wall Street Journal*, Henry Ford declared that his interest in politics was never less than it is today, and he supplemented this by stating that the various Ford plants are now turning out 7000 cars and trucks a day and that next year this will be increased to 10,000.

HALTS SHEET ORDERS FOR THIRD QUARTER

PITTSBURGH, May 29—In view of the fact that the automobile industry is one of the largest users of sheets in the country the fact that the leading interest in the manufacture of sheets is unable to take any further business for the third quarter is of significant interest. The corporation's subsidiary is unable to make deliveries before October and the books for the final quarter are not yet opened.

There continues a good demand for blue annealed and galvanized sheets and a fair demand for black sheets although independent mills are likely to compete in the black sheet market if production continues at the present rate. Automobile concerns are still making urgent requests for deliveries from Pittsburgh mills.

Chandlee Patent Ordered Delivered to No-Leak-O

BALTIMORE, May 28—The No-Leak-O Piston Ring Co. of this city announces that by a decision of the District of Columbia Court of Appeals the heirs of G. H. Chandlee, deceased, are ordered to deliver to the No-Leak-O company their entire rights to the Chandlee piston ring patent, granted in 1920.

The decision reversed that of the lower court, the contention being that the basic ideas in the patent involved were those of John E. Norwood, president of the No-Leak-O company, which were embodied in Chandlee's patent application, in order to get the benefit of Chandlee's earlier filing date. The understanding, it was claimed, was that when the patent was issued it would belong to Norwood for a specified sum and Norwood to pay the costs.

Hess Plant Sale Approved and New Dividend Ordered

CLEVELAND, May 31—The sale of the Hess Spring & Axle plant of the Standard Parts Co. to Albert J. Mayer of Cincinnati has been approved by Federal Judge D. C. Westenhaver. The purchase price for the plant, which is located in Cincinnati, was $136,000.

The court also ordered a 5 per cent dividend to be paid to the creditors whose claims have been allowed. The distribution of the 60 per cent dividend, thus far ordered, will bring the total disbursements to general creditors up to 60 per cent of their claims.

Cuts of $120 to $145 Made in Jordan Lists

Reductions Affect Both 120 In. and 124½ In. Wheelbase Models

CLEVELAND, May 28—Price reductions on Jordan cars ranging from $120 to $145 were announced yesterday by the Jordan Motor Car Co.

The new prices are as follows:

120-IN. WHEELBASE

	Old Price	New Price
3-pass. roadster, Playboy	$1,895	$1,750
5-pass. roadster, Silhouette	1,795	1,675
Brougham	2,285	2,285

124½-IN. WHEELBASE

	Old Price	New Price
4-pass. phaeton, Blueboy	$2,150	$1,995
5-pass. touring sedan	....	2,485

A few body style changes have been made on the 120-in. wheelbase chassis. The two-door brougham, formerly listing at $2,485, has been succeeded by a new four-door model selling at $2,285. The five-passenger sedan, listing at $2,485, has been discontinued on this chassis and transferred to the 124½ in. and sells at the original figure. The four-passenger coupé has been abandoned.

Chalmers' New Sedan Is Priced at $2,195

DETROIT, May 29—The Chalmers Motor Corp. has fixed the price on its new custom type seven-passenger sedan at $2,195, an increase of $100 over its former sedan price. The equipment on the car has been changed, and the tire size has been increased from 32 x 4 to 33 x 4½.

The four-passenger short phaeton model price has been reduced from $1,445 to $1,385.

Liberty National, Name of Durant's New Bank

NEW YORK, May 31—While not announced officially by W. C. Durant, the issuing of the charter at Washington discloses that the bank which the head of Durant Motors has started will be known as the Liberty National Bank in New York, with a nominal capitalization of $500,000.

Only two officials are named in the charter—Capt. A. J. Cronhardt as president, and Wallace Zweiner, who is associated with Durant, as cashier.

The bank will be located in the Fisk Building, 250 West Fifty-seventh Street.

FRENCH GLIDER HERO HERE

NEW YORK, May 29—Georges Barbot, hero of the glider flight across the English Channel, arrived in New York today for a series of demonstrations in this country with his small-engined glider.

Tommy Milton Wins Indianapolis Race

Drives H. C. S. Special with Miller Engine at Average Speed of 92.44 M.P.H.

(*Continued from page* 1194)

cause of broken connecting rods. This had been pointed out before as a weakness in the cars. Car 21 lasted only eight laps, Car 27 was in forty-one laps, Car 18 lasted 165 laps and Car 22 went out on the nineteenth lap because of a broken gas tank.

The Packard team began with three cars and was out of the race on the seventy-second lap, when Resta's car was reported to have blown a cylinder head gasket. The same reason was given for withdrawing De Palma's car and Boyer's car was withdrawn in the fifty-ninth lap because of a broken differential.

Packards' Cordial Reception

The Packards were quite the handsomest cars in the line-up and were given a strong hand at the start. The rail birds talked wisely about what these cars would do, shaking their heads over the six cylinders and ascribing much to De Palma and Colonel Vincent. These cars had been changed quite a bit in the nursing before the race and their passing was a shock and called for much sympathy. These cars, like the Millers has the Hispano-Suiza type of valve action.

This about accounts for the cars except Car 28, which was run as a "Special." It was a Miller car and was referred to in publicity for several days previous to the race as the Overland Special but when the A. A. A. Committee heard that the factory chiefs had not been consulted as to the naming of this car, the Overland part was not put on the program. Duray drove the car and it went out in the 136th lap because of a connecting rod bearing.

The reasons given above for the taking off of cars are those announced by official sources and indications are that they probably will not agree with later technical committee reports.

Busy Day for Pitmen

Pitmen had a busy day, as there were seventy-nine pit stops recorded and while most of these were announced as tire or gasoline stops, it was notable that mechanics worked on the cars at every opportunity. There were twenty-two changes of spark plugs, sometimes all of the plugs being changed. Preignition was ascribed as the cause, due to the high compression ratio, which ranged up to 7 to 1.

Thirty-three tires were changed, but often this was a precautionary measure, done chiefly because the car was at the pits, the light cars were not as destructive of tires as was predicted. In fact the Barber-Warnock went the entire distance without a change.

HOW THEY FINISHED

The following table shows all of the cars starting in the 500-mile Indianapolis race, the positions each won and what happened to those that failed to finish:

No.	Name	Driver	Finish
1	H C S	Milton	First
2	Packard	De Palma	69 Laps, Cylinder Head
3	Packard	Resta	88 Laps, Same Trouble
4	Packard	Boyer	59 Laps, Broken Differential
5	Durant	Murphy	Third
6	Durant	Hearne	Fourth
7	Durant	Hartz	Second
8	Durant	Durant	Seventh
14	Mercedes	Lauten-Schlager	16 Laps, Hit Wall
15	Mercedes	Sailer	Eighth
16	Mercedes	Werner	Tenth
18	Bugatti	De Viscaya	165 Laps, Broken Connecting Rod
19	Bugatti	Cystria	Ninth
21	Bugatti	Alzaga	8 Laps, Connecting Rod
22	Bugatti	Regenti	19 Laps, Gas Tank
23	Barber-Warnock	Corum	Fifth
25	H C S	Wilcox	60 Laps, Broken Clutch
26	Durant	Fengler	69 Laps, Broken Gas Tank
27	Bugatti	Zbrowsky	41 Laps, Connecting Rods
28	Special	Duray	136 Laps, Connecting Rod
29	Durant	Cooper	22 Laps, Through Fence
31	Durant	Elliott	Sixth
34	Duesenberg	Shafer	Tenth
35	Miller	Hill	Broken Crank-Shaft

There was quite a lot of shock absorber tightening, due chiefly to the fact that the springs had not been adjusted to such light cars and the drivers needed all of the relief that they could get.

The vibration caused considerable damage to fuel and oil lines and several such cracks had to be repaired.

Next to Miller much credit was given by the critics to Art Chevrolet for the good showing of the Barber-Warnock Ford Special. The racing fans well remembers the fine showing made by the Fronty Fords in last year's race. This was practically the same car except that

(*Continued on page* 1203)

200 Trucks in June Planned by Republic

Company, Amply Financed, to Start Operations on Large Scale Immediately

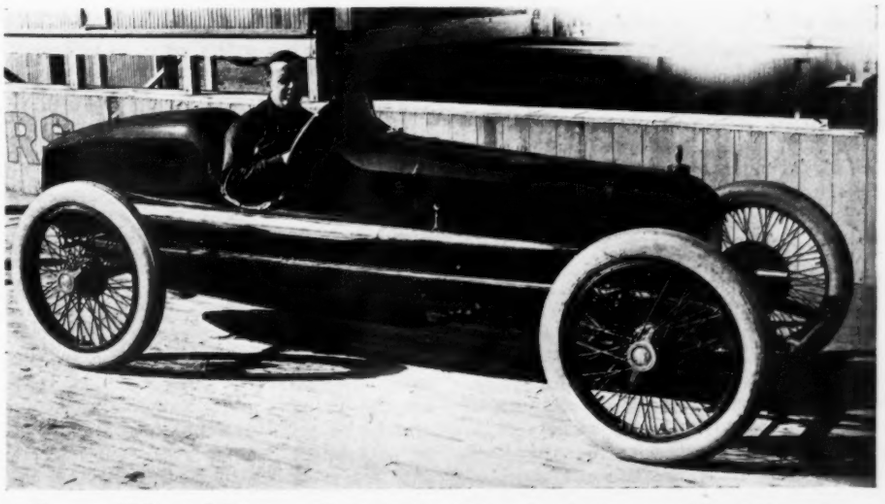
DETROIT, May 29—The Republic Motor Truck Co., Inc., formed to take over the plant and property of the former Republic Motor Truck Co., will start operations on a large scale at once and will produce about 200 trucks in June, doubling the output of 100 monthly maintained by the receivership. The new company is formed and financed by the note holders' committee which bought the property at receiver's sale and will have ample working capital supplied by New York and Chicago financial sources.

Mortimer N. Buckner, chairman of the board of New York Trust Co., will be chairman of the board of the new truck company, and O. W. Hayes, general manager of the plant, will be president and have active charge of operations. In addition to those officers, the board of directors includes J. A. Bowers, Maurice Rothschild and G. W. Morgan. Bowers is a vice-president of the New York Trust Co. Other executive officers are Maurice Rothschild, vice-president, and G. S. Crisp, secretary and treasurer. Rothschild is a New York and Chicago capitalist, and Morgan a member of the New York law firm of Breed, Abbott and Morgan.

Operating officers in addition to Hayes are E. E. Sieg, sales manager; J. C. Haggart, chief engineer; W. J. Bunn, purchasing agent, and R. E. Devogt, service manager

The company will build a remodeled line of trucks in which will be introduced many new features, including new model Continental engines. Prices will conform to the prices in the previous models.

Car That Won at Indianapolis



Tommy Milton, driving an H. C. S. Special, maintained a speed of 92.44 *m.p.h. in the eleventh annual* 500*-mile race for* 122 *cu. in. cars*

Recommends Means to Keep Air Pure

New York Academy of Science Roused by Concentration of Carbon Monoxide

NEW YORK, May 26—A study made on behalf of the Public Health Committee of the New York Academy of Medicine, has shown that under certain atmospheric conditions the concentration of carbon monoxide in the atmosphere of congested streets in this city, exceeds the upper limit of well founded health standards. This study has also shown that the ill effects of automobile exhaust gas are particularly pronounced among workers in garages and repairshops.

It is understood that the conditions in question are attributed entirely to the exhaust from passenger cars, trucks and buses, these gases having been found to contain considerable proportion of carbon monoxide, which is highly poisonous if the proportion in the air breathed exceeds certain limits.

Communicates With Societies

In order to safeguard the health environment of the city and the health interests of those engaged in work in garages and automobile repairshops, the committee has prepared the following tentative recommendations, which it is understood have been submitted to the Society of Automotive Engineers, the Health Department, and several technical and commercial associations, with a view to securing their respective attention before formal action is taken.

1. That within the city limits the sale of gasoline be limited to a high standard of purity to be determined by a special technical board appointed by the Department of Health.

2. That the Sanitary Code of the city be amended to prohibit the discharge of any kind of visible smoke. (At present it is understood that only dense smoke is prohibited.)

3. That as far as possible and as rapidly as possible, vehicles propelled by power other than gasoline, displace the gasoline driven public conveyance and commercial vehicles in the city.

4. That public garages and repairshops be required to install devices calculated to prevent any considerable concentration of carbon monoxide through the use of suitable ventilation manifolds, arranged for connection with the exhaust pipes of automobiles.

Suggests Clinical Study

5. That a clinical study be instituted by public health authorities for the purpose of ascertaining the precise effect of automobile exhaust gas on the respiratory, nervous and circulatory systems of those exposed to it in city streets regularly for considerable periods of time.

Prof. Yandell Henderson of Yale University and Dr. Howard Packard of the Department of Applied Psychology at Yale, upon whose investigation the tentative recommendations of the Public Health Committee are understood to be based, are reported to advocate the use of a chimney or vertical exhaust pipe at the back of every bus, truck and car with closed tops, this type to extend a few inches above the level of the top or certainly above the heads of the driver or passenger carried by the vehicle.

It is contended that if carbon monoxide were visible to the eye as smoke, horizontal exhausts would long ago have been abandoned. Bakery trucks in New Haven are reported to have already abandoned the horizontal exhaust.

Stutz Reports Deficit of $662,378 Last Year

INDIANAPOLIS, May 28—Reporting for the year ended Dec. 31, 1922, the Stutz Motor Car Co. of America states that, after payment of all expenses and deductions of reserves and other charges, there was a deficit for the year of $662,378 as against $632,370 in 1921.

Since the company came under the direct control of Charles M. Schwab last December, it has shown remarkable recovery, it is stated, and at the present time production and sales are at a new peak.

The detailed income account as shown in the annual statement follows:

	1922	1921
Net sales	$2,737,218	$3,071,411
Costs and expenses	3,022,184	3,098,475
Inventory losses, etc.	383,415	606,364
Loss	$668,381	$633,428
Other income	6,003	1,058
Net loss	$662,378	$632,370

The balance sheet on Dec. 31, 1922, shows cash holdings of $439,822 as against $63,162 at the close of 1921; accounts receivable of $219,189, against $75,222; and inventory valued at $1,619,157 as against $1,890,609. Accounts payable totaled $263,539, as against $152,482. The balance sheet also shows $1,000,000 of debenture bonds outstanding, as against none in the previous year.

The profit and loss surplus on Dec. 31, 1922, was given as $4,122,395 as against $4,777,705 at the end of 1921.

Sales Managers Prepare for Association Meeting

NEW YORK, May 28—The National Association of Sales Managers will hold its organization meeting at the Hotel Chalfonte, Atlantic City, June 7 to 8, directly following the convention of the Associated Advertising Clubs of the World.

Among the subjects booked for discussion are: Restricting of territories to the satisfaction of the original man; how much time should a sales manager spend on the firing line?; how many letters should be sent to a prospect?; problem of selecting salesmen; the cost of making sales; the cost of advertising and the cost of getting new business in a new territory.

Water-Rail Shippers Summoned by I. C. C.

Called on Complaint of Railroad to Explain Use of Trucks in Hauls

WASHINGTON, May 25—Complaint of the New York, New Haven & Hartford Railroad that unlawful joint partnership relations exist between certain railroads and motor truck lines has resulted in a summons by the Interstate Commerce Commission to the Erie Railroad, the Starin-New Haven Line (steamship), the Cincinnati, Lawrenceburg & Aurora Electric Street Railway, the Clyde Steamship Line and the Southern Railroad, for which F. L. Speiden publishes rates, to testify at a hearing.

No Date for Hearing

Although the commission has not fixed a definite date for the arguments, it is understood that the rail carriers have been notified to explain arrangements made with motor truck carriers for hauling freight. The claim is advanced that these arrangements are unlawful, because the truck lines are not "common carriers by railroad, or partly by railroad and partly by water."

The complaint of the New Haven railroad was based upon an alleged partnership between motor truck operators and the Starin-New Haven Steamship Line, which, it is stated, permitted the trucks to transport freight from various Connecticut communities to New Haven at rates below those quoted by the New Haven railroad.

It is further claimed that this arrangement is a discrimination in favor of motor trucks, as existing contracts between the railroad and the Starin-New Haven Line force the railroad to carry business at higher rates than the partnership between the Starin line and the trucks would do it.

Transfer Firms Mentioned

In the complaint it is pointed out that the Erie railroad handles goods between East St. Louis and St. Louis in connection with the Columbia and Fidelity Transfer companies, which are not "common carriers by railroad or part by railroad and partly by water."

Railroad officials say that the investigation will disclose many other arrangements of this character. The Pennsylvania, it is alleged, has established a trucking service on the eastern shore of Maryland, by which merchants in Baltimore load trucks with freight at Baltimore, the trucks and freight being carried on a Pennsylvania boat to Cambridge, Md., where the trucks are dumped ashore and distribute the goods, making store door delivery.

The Pennsylvania does the service, it is alleged, by means of a contract with Stone's Express Co., the Pennsylvania's charter not permitting it to do the work itself.

Packard Will Build "Single Eight" Car

Product Will Be Marketed as Companion to Its Present "Six" Model

DETROIT, May 25—In a letter to stockholders, following the announcement of a new car soon to be placed on the market, Packard Motor Car Co. declares that formal announcement and description of the new car will be made about June 16.

The new car will be called the single eight, the announcement reads, and is proclaimed the result of twenty-three years of engineering experience concentrated upon the study of requirements of cars of the highest grade.

A statement signed by Alvan Macauley, president of the company, says:

The single eight will be a companion product to the single six, but will cater to a more limited demand for a still larger and more powerful car. The fine success of the single six, in its broader field, has been extremely gratifying, and has been reflected in the company's very substantial earnings.

The single six will be continued in, we hope, increasing quantities. We shall market the single six and the single eight side by side, and believe confidently that with these two cars the company has a most excellent line with which to carry forward its reputation and prestige.

Olds Eight-Cylinder Line Has Brougham Added to It

LANSING, MICH., May 29—A new five-passenger brought has been added to the line of bodies on the eight-cylinder Oldsmobile. The price is $1,775. The finish is in weathered bronze with black top and gold trimmings. Disk wheels are standard equipment, and the upholstery is in mohair plush. The corner lights and dome light are silver finish. Walnut predominates in the interior, the steering wheel spider, gear shift lever and horn button being finished in this wood.

The doors are equipped with locking handles, and there is a gearset lock.

Checker to Move Offices to Handley Plant in June

CHICAGO, May 26—The Checker Cab Manufacturing Co. will move its general offices about June 15 to Kalamazoo, Mich., where it recently purchased the plant of Handley Motors, Inc. The Chicago factory of the company will be continued in operation until the new plant is ready for production.

The purchase of the Handley plant included all factory equipment.

GEAR SHIFT SALE DECIDED

MILWAUKEE, May 28—The Federal Court of Appeals has decided in favor of B. R. L'Hommedieu of Madison, Wis., as successful bidder for the plant and assets of the defunct U. S. Auto Gear Shift Co. at Eau Claire, Wis. Other bidders at the sale held in January disputed his bid, which was $41,600. A survey is being made to determine the feasibility of profitably manufacturing and marketing the U. S. hydraulic gear-shifting system, upon the result of which will depend the continuance of the Laursen patent in production. About 1000 units are now in use.

Stearns Will Market New Line in Summer

CLEVELAND, May 26—The F. B. Stearns Co., maker of the Stearns-Knight car, will put on the market the middle of July or some time early in August its new line of four-cylinder models.

There will be four or five models in the line, selling around $1,600, and will include both open and closed cars.

Body Builders to Meet in Detroit June 26-27

DETROIT, May 27—The Automobile Body Builders Association will hold its convention here June 26-27. The keynote will be conservation, with special reference to inefficient labor, high wages, shop methods, shop management and close competition.

Ten sessions for members and invited guests will be held the afternoon of the 26th. One of these meetings will be for passenger car body makers only; another for builders of commercial bodies; another for varnish and paint makers; another for manufacturers and distributors of body hardware, etc.

A dinner at Blossom Heath Inn will be held the evening of the first day, and the next day there will be a luncheon.

Peru Shows Tendency Toward Larger Buses

LIMA, PERU, April 30 (*by mail*)—The increased amount of advertising, not only of automotive products, but of other products, is an indication that business is now active. Not only are the newspapers carrying heavier advertising, but more outdoor advertising—the painted sign and the electric sign—is being used.

In omnibuses the tendency seems to be to put on larger, better buses carrying more passengers rather than to increase the number of small buses. This movement should bring the bus business into more substantial hands. Plans are being made to link up Miraflores and Barranco, two of the suburbs of Lima, by the extension of the Avenue Leguia, which is suitable for automobiles, thus extending the radius of automotive transport.

Several large modern buildings erected by a prominent North American contracting company have been completed or are nearing completion in Lima. Increased building has always been regarded as an indication of prosperity.

Austin Planning Car with Engine at Rear

Idea Approaching Experimental Stage—British Colonies Demand Better

LONDON, May 19 (*by mail*)—Both passenger car and motorcycle makers report a slowly increasing demand from overseas, especially from Australia, and this applies, in respect of cars, to all types from the 67 cu. in. light cars to some of the largest sixes.

Austin states that he expects to ship 1000 of his 12 hp. (2¾ x 4 in.) models alone to Australia this year, as well as a considerably greater number of "twenties" than last year, and that orders from New Zealand are encouraging.

Doubtless the increased demand for Austins overseas is due in no small degree to the recent offer to supply these cars at ports in British Colonies at approximately the same price as those then current in England.

Austin has designed an engine-at-rear model. It is mainly on paper or approaching the experimental stage at present and is intended primarily for sedan bodies. The idea is to provide more body space on a given length of wheelbase, to lower the center of gravity, to make the suspension more suitable for wide variations in load and to obviate fumes from the engine reaching the body interior.

In Austin's projected chassis the entire layout is reversed; that is to say, the engine and clutch are at the rear, and the gearset and final drive casing are in front with cardan shafts to the front wheels which are also steerers.

Louisville Railway Head Announces Bus Adoption

LOUISVILLE, KY., May 29—Bus service will be inaugurated in Louisville within a month, James P. Barnes, president of the Louisville Railway Co., announces following final action of the executive committee.

"Installation of this service is the result of six months study," Barnes says. "It marks the inauguration of a new policy in local transportation, namely, the abandonment of hard and fast precedent as to means of mass transportation, and the furnishing of any type of transportation facilities for which there is a public demand."

Twelve single-deck buses, costing approximately $7,500 each, are being built in Cleveland and twelve double-deck buses, each costing $9,000, will be supplied by the Yellow Coach Manufacturing Co., Chicago. The former will seat twenty-five persons and the latter, sixty-eight.

The service will be operated by the Kentucky Transportation Corp. with capital stock of $200,000 which will be held by the railway company.

Men of the Industry and What They Are Doing

Wilson Moline Body President

E. H. Wilson has been elected president and treasurer of the Moline Body Corp. to succeed the late Thomas M. Sechler. The directors have chosen Fred Peters as vice-president and A. C. Vinton, secretary.

Hood Heads Hood Rubber

Frederic C. Hood, treasurer and general manager of the Hood Rubber Co., has been elevated to the presidency through the resignation of Judge Albert D. Bosson, who becomes chairman of the board of directors, a newly created position.

F. L. Jewett Returns Home

F. L. Jewett, first vice-president of the Paige Detroit Motor Car Co., has resumed his place in the Paige organization following recuperation from a severe illness which compelled his sojourn in Southern California since late last year. He was given a rousing reception on his return to the plant, in which all members of the organization took part.

Thomson to Visit South America

C. S. Thomson, export manager of the Four Wheel Drive Auto Co. of Clintonville, Wis., expects to sail for South America June 6 on a five months trip, calling on FWD dealers in South American countries, spending a little time with each of them.

George W. Kerr Resigns

George W. Kerr has resigned as engineer of coach work of the Rolls-Royce of America of Springfield, Mass. No plans for the future are announced.

Cotta Appoints Pfeiffer

Benjamin S. Pfeiffer has been appointed consulting engineer of the Cotta Transmission Corp. of Rockford, Ill. His offices are in the First National Bank Building, Chicago.

Resignation of Mead

Frank R. Mead has resigned as vice-president and treasurer of the Victor Pagé Motors Corp. of Stamford, Conn. His future plans have not been determined.

Dr. Dickinson Still with S. A. E.

In accordance with an announcement made in these columns several weeks ago, Dr. H. C. Dickinson, who for some time was research manager of the Society of Automotive Engineers, has returned to the Bureau of Standards, where he holds the position as chief of the Division of Thermometry. Arrangements have been made, however, whereby Dr. Dickinson continues to hold the position of research manager of the society and will give a portion of his time to the direction of S. A. E. research work.

John A. C. Warner, formerly Chief of the Aeronautic Instrument Section of the Bureau of Standards, has been appointed assistant research manager of the society and will give his entire time to S. A. E. research activities. Warner will serve under Dr. Dickinson and relieve him of much of the work which formerly required his personal attention.

V. H. Gottschalk, former research engineer of the society, who served as an assistant to Dickinson, is no longer connected with the S. A. E. staff but is engaged as a fellow in research work at the Bureau of Standards.

Mayer in Charge at Detroit

Arthur Mayer, sales manager of the Heinze Electric Co. of Lowell, Mass., maker of the Ames horn, will have charge of the company's general sales office just opened in the Garfield Building, Detroit.

Younggreen Joins Agency

Charles C. Younggreen has resigned as director of advertising and publicity of the J. I. Case Plow Works Co. of Racine, Wis., to become vice-president of the Klau-Van Peiterson-Dunlap Advertising Agency of Milwaukee.

Foundrymen Elect Babo Head

K. C. Babo of Dodge Brothers has been elected president of the Detroit Foundrymen's Association. Others named as officers were Robert Crawford, Atlas Foundry Co., vice-president; D. R. Hay, secretary, and Fred Cowan, treasurer. Members of the executive board are E. S. Van Dolson, Dodge Brothers; Fred Erb, Packard Motor Car Co.; E. I. Chase, Cadillac Motor Car Co.; H. M. Lane, H. M. Lane Co., and E. S. Pike, Detroit Steel Castings Co.

Maxwell Promotes Secor

J. H. Myler, director of traffic of the Maxwell Motor Corp., announces the appointment of N. W. Secor as traffic manager of all plants of the corporation in Detroit, Dayton and Newcastle. For several years Secor served with the Michigan Central Railroad, and in 1917 was appointed general agent for the road with offices in Detroit. He left the Michigan Central in 1917 to become connected with the Olds Motor Works, Lansing, as traffic manager. He joined the Maxwell organization Jan. 1, 1923.

Bryant with Greenfield Tap

E. J. Bryant, formerly identified with the Brown & Sharpe Manufacturing Co. of Providence, R. I., and more recently associated with the Taft-Pierce Co. of Woonsocket, has joined the Greenfield Tap & Die Corp. and will have charge of the gage department.

Lee Reports Europe Is Good Cab Market

Makes Tour of England and Continent—Establishes Agency in Britain

CHICAGO, May 29—An extensive market in Europe for American made taxicabs is seen by Gordon Lee, manager of foreign and domestic sales for the Yellow Cab Manufacturing Co., who has just returned from a tour of England and the continent. While in Europe, Lee organized the Yellow Cab Manufacturing Co. of England, Ltd., a selling organization financed and managed by European interests. This company will have a branch in Paris and affiliations with the Yellow Cab Co. of Scandinavia and similar companies in Madrid and Barcelona, Spain.

Holland and Belgium Included

Other cities in which Lee expects the products of the Yellow Cab Company to be in operation soon are Amsterdam, Brussels, The Hague, and Antwerp. Operation in these cities will be under the direction of the Paris branch. Speaking of conditions, Lee said:

We already have 25 yellow cabs in operation in Paris and orders for 600 more for use there. Ultimately we expect 1500 of our cars to be in use in Paris. We made a very careful study of the situation over there and have devised a cab for European export which enables us to compete with the best manufacturers in France in spite of the high duties we have to pay.

The automotive transportation situation in Europe is peculiar in that so few persons can afford to own and operate their own cars. A Ford in France costs about $1.600. Gasoline in Europe costs from 50 to 70 cents a gallon. Under these conditions operation of a privately owned car becomes a luxury that few can enjoy. The demand for taxicab service is correspondingly increased. At the same time it must be an economically operated service.

Smaller Car for Europe

That is why we are building for European export a smaller and lighter model than our standard American cab although the cab now being made for domestic use is 1,000 pounds lighter than the model we were making up to a few months ago. We also have improved the engines of our European models until they equal the best of the French products in mileage. We also have devised a system of operation in Paris which eliminates dead mileage to a great extent. We are scattering garages in the outlying sections of the city at points where in the morning the cabs can readily pick up fares going into the city.

On this trip I took the necessary steps to protect in all countries the trade mark and name "Yellow" which is one of the great assets of the company.

Lee told how the Yellow Cab Company is rapidly opening up sales in other countries, especially South America.

Output of Ethyl Gas Limits Present Sale

Cincinnati and Dayton Only Cities That Are Likely to Get It This Year

DETROIT, May 25—Sales of tetra ethyl lead, the General Motors Chemical Corp.'s anti-knock fuel, which is to be marketed under the name "Ethyl Gas," probably will be confined to Dayton and Cincinnati for the balance of the year owing to low production, but as greater production is attained the sale of it will be extended to all cities. Detroit and Pittsburgh are mentioned as the next cities in which it will be introduced.

Selection of Dayton and Cincinnati is due to the proximity of these to the seat of distribution at Dayton and also to the hilly condition in that section, which gives the fuel greater opportunity to demonstrate its efficiency. Dayton will have one filling station at which the fuel will be distributed, and Cincinnati will have ten, the latter getting into operation within the next fifteen days.

Jobbers to Be Distributors

General distribution of ethyl gas when merchandising plans are completed probably will be through independent gasoline jobbers operating service stations, the aim being to develop as distributors those jobbers having an annual capacity for 1,000,000 gal. of gasoline and upward. The addition of the ethyl gas will increase the cost of gasoline about three cents a gal., the jobber or station operator, however, not realizing any extra profit through the sale of the mixture. The increased business in gasoline resulting from the admixture of ethyl gas will be expected to compensate the jobber and operator for the handling of special fuel.

The Dayton Engineering Laboratories of General Motors Corp. is at present developing a metering device, which can be coupled to gasoline measuring pumps in such a manner that the ethyl gas can be injected into the gasoline in fixed percentages as it is sold. This will interfere in no way with the use of the pump for the sale of gasoline to those not wishing the additional mixture.

Devices in Experimental Stage

These devices are still in the experimental stage to some extent, and will be under trial in the Dayton and Cincinnati distribution. Until they are ready to be built on a production basis, the sale of the fuel, for this reason alone, would be confined to a limited quantity.

The development of these metering devices to a point of complete efficiency in mixing and accuracy in measuring is recognized as important in the success of the new fuel and its general adoption by the motoring public. Mixtures that vary to any appreciable extent will not permit the fuel to be used most satisfactorily, and considerable care is being exercised in introducing it that the operator understands fully the necessity of obtaining exact proportions.

As an instance of the care in its introduction, the company will have operators drain off gasoline in tanks of cars being filled for the first time with the special mixture gas. This will involve a certain amount of extra work in the first period of merchandising, but it illustrates the care the company is taking to make certain that first impressions are good. Gasoline drained off is credited to the purchase of the new fuel.

Ethyl gas will be given a wine color in the manufacture to distinguish it from ordinary gasoline. This is also for the purpose of insuring care in the handling as the fuel is slightly injurious under certain conditions. In coloring the fuel, it is noted, the company is following the action of the government in the war, when the aircraft fuel was tinted to prevent its becoming confused with gasoline for cars.

The problem of general distribution will be an involved one. It will require the development of a system of storage tanks at important points throughout the country and the acquisition of tank cars to carry the fuel from manufacturing points to tanks. Special truck fleets will also be required for local distribution. Under the circumstances, general distribution of the product is still indefinite, but will be effected as rapidly as the company can complete its plans.

Addition to Laboratories

DETROIT, May 25—Dayton Engineering Laboratories Co., division of General Motors, has just dedicated the largest single industrial building in Dayton, giving the company an additional manufacturing space of 375,000 sq. ft. and bringing the total floor space to just under 1,000,000 sq. ft.

The building was dedicated with elaborate ceremonies.

TRAFFIC REGISTERED BY AUTOMATIC DEVICE

WASHINGTON, May 23—New methods in determining traffic on highways have been adopted by the engineering division of the University of Maryland, which has installed an automatic device on the Washington-Baltimore road. The work is undertaken in cooperation with the Federal Bureau of Public Roads and the States Roads Commission of Maryland.

Its purpose is to indicate automatically, on a permanent record, not only the number of vehicles that pass over it, but their weight.

Dean A. N. Johnson of the engineering department of the university says: "It will give a basis for determining the economic worth of our roads and indicate into what our highway transportation is developing."

Tommy Milton Wins Indianapolis Race

Drives H. C. S. with Miller Engine at Average Speed of 92.44 M.P.H.

(*Continued from page* 1199)

it carried a much larger crankshaft, which Chevrolet had installed. This car finished fifth, coming in behind four Miller cars.

Fred Duesenberg also was sharing the glory of the race for the excellent performance of his car, which was qualified only the morning of the race. Duesenberg had entered three cars but was late getting them completed and only one was on four wheels on Tuesday evening, Wednesday morning this car was qualified and the wisemen of the press stand voted that if it had been better driven that it would have finished much higher. At that it was in the money. Owing to difficulties that were beyond Duesenberg's control he only had three weeks for these cars.

The expectations of the rail-birds after seeing the cars in action that it would be a hard race for the drivers came up to expectations there were twenty-three driver changes and so rapidly did these come after the 250 mile period that there was much confusion as to who was driving which car. The cars were not well sprung and the vibration and jolting were hard on the drivers.

Three Drivers Make Course

Only three drivers, Murphy and Hartz of the Durant team and Corum on the Ford made the entire route. It was said by observers that the drivers were not in the best of condition because they had been working nights in getting the cars into shape. At the end, those who had gone the distance or most of it showed unusual fatigue.

The technical comment before the race was ended was that if a 122 cu. in. race is to be successful there must be more attention given to other parts than the engine. The entire chassis and the body must be designed accordingly. The three 183 cu. in. engines that were reduced to 122 cu. in. capacity failed to deliver.

Cars Too Bulky for Engines

The three cars driven by Elliott, Hill and Duray were revised editions of last year's cars and only Elliott finished. They were too bulky for the small capacity engine. These cars did not compare well with the Miller's that were built from the ground up, and these were all Millers of a former vintage.

The day was wonderful, cool and sunshiny but the sun was not dazzlingly bright.

The only serious accident was when Tom Alley, driving for Cooper lost control of his car on the back stretch and tore down three panels of fence. Alley was seriously hurt but tonight was said to be in no immediate danger.

Florida Takes Steps in Aid of Aviation

Legislature Asked to Appropriate $100,000 to Promote Commercial Work

JACKSONVILLE, FLA., May 28—The State of Florida, under the terms of a bill now before the Legislature, proposes to appropriate $100,000 as a fund for "the aid of aerial transportation into and within the State of Florida."

The proposal has attracted nation-wide attention, as, in the preamble of the bill, the principle is recognized that the war investment in American aviation should be realized for the benefit of commerce and industry, through the establishment of public facilities, lacking which, aerial transportation lines cannot reasonably be expected to operate.

It is proposed that the sum "be expended in defraying one half the cost and expenses of buying suitable location for the erection of and in erecting suitable hangars and workshops for the housing and care of the flying machines of bona-fide aerial transportation persons, firms or corporations operating" within the State.

Conditions imposed are "that one or more counties and/or municipalities of the State of Florida, jointly and severally, directly or indirectly, defray one-half of the expense of buying locations for the erection of and in erecting the buildings"; and "that the respective counties and/or municipalities defraying one half of the said expenses . . . shall govern and control the franchising and leasing gratuitously the respective hangars" to bona-fide operators.

To qualify as a "bona-fide operator" an organization must have five or more aircraft utilized in the transportation of passengers, mail or express.

TOWNSEND WILL RESUME

JANESVILLE, WIS., May 28—The Townsend Manufacturing Co., which prior to bankruptcy a year ago manufactured kerosene and oil engines, tractors and tractor chassis, will be rehabilitated by Roy Townsend, a member of the former concern, whose bid for the machinery of the plant has been accepted by the Federal Court. This makes it possible to preserve the industry intact physically. It is planned to resume operations on a small scale June 1 and gradually step up production.

Automotive Exports Increased in April

Value of Automobile Shipments Was $805,050 Greater Than in Previous Month

WASHINGTON, May 28—Continued expansion of the automotive export trade is disclosed in the statistics of foreign trade for April. The value of automobile shipments increased $805,050 over the total for the preceding month. The statistical table shows that 15,608 automobiles, including chassis, were exported in April, having a declared value of $10,094,640. The gain in volume amounted to 2,214 automobiles.

The export trade in motor trucks and buses also increased as there were 2230 trucks and buses valued at $1,276,048 sent abroad in April, an increase of 663 trucks and a gain of $229,973 in value.

An increase in value of parts and accessories was also reported, the value of these items aggregating $4,964,450 for April.

Reports have not yet been received as to the volume of April shipments from Canada.

Table That Shows Shipments of Products of the Automotive Industry from the United States in April, 1923, and the Total Exports Made in Ten Months

	Month of April				Ten Months Ending April, 1923			
	1922		1923		1922		1923	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	2,337	$5,533,275	15,608	$10,094,640	35,331	$30,483,112	89,648	$63,923,546
Electric trucks and passenger cars	20	35,791	26	35,343b	94b	147,326	256	334,410
Motor trucks and buses, except electric (d).	.....	.....	.....	.....a	2,727a	2,851,223	.....	.....
Up to 1 ton	593	242,058	1,740	609,502b	1,583b	767,314	10,239	3,783,474
Over and up to 2½ tons	217	270,572	406	469,599b	626b	899,542	2,729	3,275.994
Over 2½ tons	68	161,717	84	196,947b	168b	406,289	618	1,694,866
Total motor trucks and buses, except electric (d)	878	674,347	2,230	1,276,048	5,104	4,924,368	13,586	8,754,334
PASSENGER CARS								
Passenger cars, except electric (d)	.....	.....	.....	.....a	13,708a	12,164,579	.....	.....
Value up to $500 (inclusive)	.....	.....	6,365	2,077,274	.....	.....b	16,719b	5,662.069
Value over $500 up to $800 (e)	4,024	1,670.697	2,567	1,696.232b	9,819b	4,748,154	32,426	17,696,922
Value over $800 up to $2,000	2,211	2,506,904	4,184	4,347,139b	6,043b	6,691,368	24,762	26,248.850
Value over $2,000	204	645,536	236	662.604b	563b	1,807,317	1,899	5 226,961
Total passenger cars, except electric (b)	6,439	4,823,137	13,352	8,783,249	30,133	25,411,418	75,806	54,834,802
PARTS, ETC.								
Parts, except engines and tires*	15,588,304	3,933,488	.....	.....	.....	26,671,517c	79,316,512c	18,618,812
Automobile unit assemblies*	.....	.....	4,394.256	755,059	.....	.....b	5,566,384b	945,068
Parts and accessories*	.....	.....	22,487,742	4,964,450	.....	.....b	109,202,429b	18,472,009
Automobile service appliances (n.e.s.)*	.....	.....	125,086	49,337	.....	.....b	311,956b	169,568
Station and warehouse motor trucks (No.)	5	2.339	5	6,808	99	120,876	107	73.071
Trailers (No.)	15	6,198	145	22,815	199b	97,886	742	285,098
Airplanes (No.)	1	3,000	4	4,300	42	148,765	33	350,730
Parts of airplanes, except engines and tires *	2,305	1,412	61,912	4,952	.....	72,966	427,357	231,491
BICYCLES, ETC.								
Bicycles and tricycles (No.)	1,066	16,172	2,461	20,815	.....	454,644	17,908	145,624
Motor cycles (No.)	1,248	332,215	1,962	446,865	7,844	2,121,016	15,916	3,741,131
Parts, except tires*	351,245	158,587	314,017	155,151b	1,064,022b	560,774	2,292,047	1,213,310
INTERNAL COMBUSTION ENGINES								
Stationary and Portable—								
Diesel and semi-Diesel (No.)	5	2,073	20	22,862b	48b	31,345	561	275,688
Other stationary and portable (No.)	1,607	216,935	.....	.....	13,079	2,081,160c	14,729c	1,781,589
Not over 8 hp	.....	.....	2,537	184,233	.....	.....b	8,374b	635,383
Over 8 hp	.....	.....	160	57,196	.....	.....b	530b	305,262
Automobile engines	7,132	773,315	.....	.....	19,160	2,508,040b	15,619c	1,910,857
For motor trucks and buses	.....	.....	969	112.829	.....	.....b	1,047b	128,925
For passenger cars	.....	.....	6,777	758,318	.....	.....b	15,830b	1,806,564
Engines for tractors	.....	.....	47	21,467	.....	.....b	88b	38,502
Engines for aircraft	8	9,125	3	517b	34b	21,100	69	38,652
Engine accessories and parts for*	769,653	274,864	577,214	287,616b	2,324,555b	882,476	5,675,693	2,404,601
All other engines and parts of*	.....	.....	.....	.....	.....a	3,940,067	.....	.....

a—July 1 to Dec. 31. 1921. b—Jan. 1 to April 30. c—July 1 to Dec. 31, 1922. d—Includes electric prior to Jan. 1, 1922. e—Includes cars valued up to $800 prior to Jan. 1, 1922. *—Pounds.

Railroads Pay Claims for Shipping Losses

Disburse $1,760,842 on Account of Car, Truck and Accessories Shipments

NEW YORK, May 28—American railroads in 1922 paid a total of $1,760,842 in claims for losses, damage and delay on shipments of automobiles, motor trucks and accessories, according to figures made public by the committee on freight claim prevention of the American Railway Association, in connection with the committee's thirty-second annual convention in Montreal on May 29.

This figure represents 3.7 per cent of the total claims paid on all commodities, amounting to $48,084,995.

In 1921 the carriers paid $96,730,376. Of that amount, the claims paid on automobiles, motor trucks and accessories totaled $3,311,560, or 3.4 per cent of the aggregate claims.

Comparison of the 1922 and 1921 figures show that, although the railroads' percentage of claims paid on automotive equipment and accessories in 1922 was slightly more last year than in 1921—3.7 per cent as against 3.4 per cent—nevertheless, the total of these claims was 46.8 per cent smaller last year than in 1921—that is, only $1,760,842 in 1921, as against $3,311,560 in 1922.

Of the 1922 automotive total $3,311,560, the claims due to losses amounted to $860,142, or 48.8 per cent; due to damage, $893,927, or 50.8 per cent; due to delay, $6,773, or four-tenths of 1 per cent.

The figures are based on returns from 226 carriers representing 96 per cent of the mileage of American members and 13 per cent of the mileage of Canadian members of the American Railway Association. Other figures issued show that losses from all causes were generally greater on carload than on less than carload shipments.

Builder of Morris Cars Planning 50,000 in 1924

LONDON, May 19 (*by mail*)—The maker of the Morris light car, which even now has the biggest output of any automobile plant in England, having delivered 8600 cars during the first seventeen weeks of this year, is evidently preparing for an output of 50,000 for 1924.

This deduction is founded upon definite information that the company is seeking quotations for accessory sets at the rate of 1000 per week, as from the end of next September.

Until this year Morris has been concentrating on one type of chassis for two-seated and four-seated bodies with a wheelbase of 8 ft. 6 in., track of 4 ft., and a four-cylinder engine with a bore and stroke of 2¾ x 4 in. With variations in equipment these cars have been selling at prices ranging from approximately £200.

Since the show last November two additional chassis models have formed a small proportion of the output. These are another four-cylinder model with a 3 x 4 in. engine, used with the original chassis and transmission, and a six-cylinder model with a 2¾ x 4 in. bore and stroke in a chassis of 9 ft. 3 in. wheelbase; here again the transmission is identical with that of the original type.

It is the latter, however, which forms the bulk of the present output, probably 95 per cent, although definite figures cannot be obtained.

French Seek to Replace "H. P." Term with "CV"

PARIS, May 19—An effort is being made in French automotive circles to substitute the expression *CV* (chevaux-vapeur) for the English expression *H. P.*, the Government aviation department having definitely decided against the use of *H. P.*, and the Syndicate of Internal Combustion Engine Manufacturers having done likewise.

It is pointed out that there is a lack of uniformity between English and French horsepower, for while the former is equivalent to 75.9 kilogrammeters per second the latter corresponds to 75 kilogrammeters. The advisability of getting a uniform standard is insisted on.

Bryan Harvester Makes Light Steam Tractors

PERU, IND., May 26—Production of light steam tractors by the Bryan Harvester Co., Inc., has commenced, the first shipments going to the California-Bryan Steam Utilities, Inc., of Los Angeles.

Other shipments have been made to Ohio and Illinois distributors. The tractor is designated as a 15-30. The company is said to contemplate production of a steam truck using the same power plant as that in the tractor.

NEW STEAM CAR DESIGNED

CHICAGO, May 26—The American Steam Truck Co., with executive offices in Chicago and a factory in Elgin, Ill., has designed a new light steam passenger car. The first completed chassis of the new light model has been undergoing tests for several weeks. It has a 109 in. wheelbase. It is understood the price will be in the neighborhood of $1,200.

Hoover Would Widen Trade Body Activity

Favors Modification of Anti-Trust Laws as Aid to Association Work

WASHINGTON, May 28—Commendation of trade associations was the theme of Secretary of Commerce Hoover's address before the American Wholesale Grocers Association here last week. Mr. Hoover believes there should be some modification of the anti-trust laws, because they have excluded certain practices of trade associations that would be for the public good.

"We are living under undue restrictions in trade activities," he said, as he pointed out that anti-trust laws which hamper business now were conceived at a time when great organizations of capital were forming, adding that the laws were not generally intended to hamper legitimate trade organizations.

"Many functions of trade associations are in public interest," he declared, "and few of the trade associations have any desire to interfere with the law of supply and demand or to fix prices. The great majority of trade associations are formed for the public welfare. They help to eliminate waste in distribution by doing work constructively in the service of the public."

Favors Filing Data

The Secretary declared he would favor a plan which would permit and require trade associations upon their organization to file with some public body the functions they propose to undertake. The association should be allowed to proceed, if its objects are thought worthy and for the public good, until such time as it was thought that it was engaged in some functions not for the public welfare, when they should be prosecuted.

Associations are given the task of policing among their own members, and this policy, if legalized to the full extent necessary, would give great impulse to the ending of waste in business, he asserted.

MORE PACKARD STOCKHOLDERS

DETROIT, May 26—The number of common stockholders of the Packard Motor Car Co. has increased more than 100 per cent in the last year, there now being 2912 compared with 1139 in 1922.

Table of Imports and Reimports of the Automotive Industry for February, 1923, and for Eight Months

	Feb., 1922		Feb., 1923		Eight months Ending Feb. 28 1922		1923	
IMPORTS	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles and chassis	26	$44,965	17	$42,025	339	$530,003	353	$565,494
Other vehicles and parts for them	..	65,697	..	149,882	..	599,904	..	548,791
REIMPORTS								
Amount of duty collected	..	.....	..	.....	..	.....	..	(a)208,152
Automobiles (free of duty)	200	294,357	457	548,872	2,289	3,472,359	1,971	2,623,440

(a) Beginning Sept. 22.

BANK CREDITS

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

Advances in prices of some commodities which had been weak lately, accompanied by a rally in stock prices, have evidenced the underlying strength of the general industrial situation.

Steel production continues at the high level reported a week ago, while the slower pace in cotton manufacturing continues and there is reduced activity in the building industry, particularly in New York.

Car loadings, after a slight recession in the preceding week, increased 13,500 in the week ended May 12. The latest reported loadings were the largest total for this year and only about 4 per cent below the highest autumn record.

Bank clearings for the week ended May 24 showed a decline of approximately 3 per cent from the previous week.

Only minor changes were recorded in last week's statement of the Federal Reserve banks. Discounts increased $2,982,000, while deposits declined $7,411,000, accompanied by a reduction of $5,299,000 in Federal Reserve note circulation. How slight is the need for increased reliance upon rediscounting by the member banks is evidenced by the fact that, despite considerable fluctuations from week to week, the net growth in their accommodation at Reserve banks from April 4 to May 23 was only $5,083,000.

Loans and discounts by the reporting member banks advanced $15,913,000 in the week ended May 16, as compared with a decline of $64,000,000 in the preceding week. The increase of $128,475,000 in investments was a result of the issuance of a new series of Treasury notes on May 15.

Little change was noted in time money rates last week. Six months bills were quoted at 5¼ to 5½ per cent, compared with 5 to 5¼ per cent a week earlier. Quotations for other maturities remained unchanged.

New England Issues List of Approved Head Lenses

HARTFORD, CONN., May 28—The list of twenty-two makes of automobile headlight lenses as approved by a conference of motor vehicle department heads, representing all of the New England States, New York, New Jersey, Pennsylvania, Maryland and Ohio, has been announced by Secretary MacDonald.

This list, known as Class A, is as follows: Alpheco (8⅛ in. only); Bausch & Lomb; Benzer Type A; Brown (reflector); Conaphore Type F (clear and amber colored); D. B. (Dodge Brothers, 8⅝ in, only); Dillon Type I; Flintex; Ford H (8⅛ in. only); Guide Ray Type A (headlamp); Holophone No Tilt; Hudson (8⅛ in. only); Lee Knight; Legalite M III; Liberty; Liberty Type D; Miro-Tilt (headlamp); Wills Sainte Claire; Monogram (Durant, Grant, Maxwell, Oldsmobile, Overland, R & V, Rickenbacker, Stearns, Stutz, Velie, Willys-Knight); Osgood B23; Patterson; Parab-O-Lite Type F.W.; Smith.

There are other devices upon which the conference has not reached a decision as yet and which will be listed as soon as action is taken.

A western conference has been called for the near future, at which it is hoped that this standardizing work may be adopted by other States.

FINANCIAL NOTES

American Bosch Magneto Co.'s financial statement as of Feb. 28, 1923, shows assets of $11,415,684, as compared with $10,589,958 in 1922. Real estate figures at $1,023,018; machinery and equipment at $804,314; merchandise, material and stock in process of manufacture, $3,350,303; cash and debts receivable, $1,712,301; patent rights and tracings, $755,000; furniture and fixtures, $2,164,663; automobiles, $74,601; life insurance, $7,732, and deferred charges, $281,995. Liabilities include: Capital stock and surplus, $6,073,597; accounts and notes payable, $2,005,666; depreciation reserve, $819,326; 8 per cent gold notes, $2,500,000, and reserve for doubtful accounts, $17,095.

Reynolds Spring Co., Jackson, Mich., has declared a dividend of 1¾ per cent on the preferred A stock, payable July 1, to stockholders of record June 11. It also has declared a dividend of 1¾ per cent on the B stock. The company states that prospects for the last six months of this year are excellent. At the meeting at which the dividends were declared, John H. Merrill and Herbert S. Reynolds were elected to fill vacancies on the board.

Mullins Body Corp., Salem, Ohio, reports surplus, after all deductions, for the first quarter of the year of $124,548. Gross sales were $772,388; gross profit, $80,718; operating profit, $34,580; profit after charges, $34,453, and surplus, after other income, $124,548. Profit and loss surplus March 31 last totaled $2,671,634, as against $1,976,809 on Jan. 1 last year, after adjustments and dividends.

Paige-Detroit Motor Car Co. has declared a dividend of 3½ per cent on the common and the regular quarterly dividend of 1¾ per cent on the preferred. The common is payable July 1, to stock of record June 20, and the preferred on the same date to stock of record June 15.

Packard Motor Car Co. reports April earnings of $1,20,000 after all deductions except taxes.

High Priced Car Field Seen on Atlantic Coast

DETROIT, May 29—The outlook for high priced car sales in the Atlantic Coast district during the balance of the year was declared excellent by D. A. Burke, vice-president of the Peerless Motor Car Co., following a trip to important distributing centers in this district.

Aside from a slowing down in business in the summer months, he said, distributors were looking for a volume sales in keeping with the early months of the year.

R & V Plans to Unite Three Corporations

Financing Arrangement Would Liquidate $1,900,000 of Bank Indebtedness

EAST MOLINE, ILL., May 28—Bank loans, totaling $1,900,000, will be liquidated by Moline Plow Co. securities and the three R & V corporations will be consolidated into a single company under a new plan of financing submitted to the stockholders of the R & V interests by H. A. Holder, president. In his letter, Holder asks for views of the stockholders upon the reorganization plan, under which the Root & VanDervoort Corp., the Root & VanDervoort Engineering Co. and the R & V Motor Co. would be merged in one corporation.

Supplementing the letter outlining this plan of finances, announcement is made that the Yellow Sleeve-Valve Engine Works, Inc., will exercise its option and purchase the R & V plant at Seventh Street, the greater portion of which it now occupies. The price for this unit is $325,000, and to accomplish this, Boston interests have advanced a temporary loan of $300,000. The Yellow Sleeve-Valve Engine Works, which makes engines for the Chicago Bus Co., will pay $100,000 in cash and $225,000 in finished engines.

Under the terms of an agreement with the Yellow concern, the R & V plant will be permitted to occupy a part of the Seventh Street plant for a period of three months following the execution of the property transfer. If at the end of this period the Yellow Sleeve still has unoccupied space, the R & V may occupy this. The three month period gives the R & V officers opportunity to complete plans for a future manufacturing site, and although several prospective locations are considered, it is announced that the plant will remain in the tri-cities.

The removal of the R & V plant will depend in a measure upon the extension of the Yellow company production in East Moline. Just now, in addition to its engines, the firm is manufacturing clutches and chassis units for the Yellow Cab and the Chicago Motor Bus Co., and it is steadily increasing the pace of the plant.

Ford Doubled Foreign Business in 4 Months

DETROIT, May 25—During the first four months of the year foreign sales of Ford cars and trucks reached a total of 76,142, which is 34,883 more than were sold in the same period a year ago. In the same months tractor sales abroad totaled 4534, which compares with a total of 1894 last year.

An outstanding feature of the business is the demand from Scandinavian countries. Through Denmark, Norway and Sweden sales are reported to show an unprecedented increase.

Tire Makers Deny Big Surplus Report

Also Scout Idea of Retrenchment and Rumor of Likely Shutdown in July

(*Continued from page* 1194)

a huge surplus of tires exists at the present time and that many factories will be compelled to materially retrench and possibly to shut down entirely about July 1, to permit absorption of the surplus and to prevent a long drawn out slump period.

There has been no material curtailment of tire output in the Akron district, and manufacturers say none is contemplated. Whatever slowing down does come will not be in excess of 25 per cent, while it is not likely to exceed 10 per cent in the opinion of many manufacturers.

Harvey Firestone does not see any shoals ahead for the tire manufacturing business. He does claim, however, that some overproduction of tires exists at the present time and holds the opinion that many dealers throughout the country are perhaps too heavily stocked for good business and quick turnover.

Cautious Against Overproducing

Describing Akron as more prosperous and more sound economically than the city has ever been industrially, Firestone said:

The big question is how long will our prosperity continue. My answer is that Akron's prosperity will continue just as long as none of us gets too avaricious or ambitious to make all the money that can be made in the rubber industry. Manufacturers in Akron must stand together and must produce cheaper and better tires than outsiders so that we may continue to hold our present level of prosperity throughout the year.

I do not believe that we have reached the peak of our prosperity although we are more prosperous today than we have ever been. And I firmly believe that whatever retrenchment or tapering off of production may come will be merely a dent in the hill as we keep going up to higher levels of production and prosperity. We are making and selling more tires than we did in the old boom days of late 1919 and early 1920. I think that is true of all Akron manufacturers. It at least is very true of the Firestone company.

But we must not overproduce. The retrenchment in the building industry has been caused by the fact that three houses were being built where only two should have been undertaken and when only two were necessary. The same thing applies to the tire industry. We must not build three tires when there is need for only two.

Without question many of the tire dealers have overstocked.

SEAMAN DOUBLING CAPACITY

MILWAUKEE, May 25—A $500,000 addition, doubling the capacity of the Seaman Body Corp., Milwaukee, is being completed and will be ready to start production June 1. The building is five stories high, 225 x 450 ft., and is identical with the original factory erected three years ago. The Seaman company is engaged principally in building closed bodies. Charles W. Nash, head of the Nash and LaFayette companies, owns a half interest in the concern, which is the outgrowth of the pioneer W. S. Seaman Co., Milwaukee.

INDUSTRIAL NOTES

Charles C. Hubbell, a rubber manufacturer of Greenburg, Pa., has secured an option on the plant of the Rotary Tire Co., near Zanesville, Ohio, which has been in the hands of a receiver for about eighteen months. Recently title was obtained by the Franklin Mortgage Co. of Columbus. Hubbell plans to organize a company for the manufacture of tires and tubes. The option is for thirty days, when it is expected financial arrangements will be completed.

Habig Manufacturing Co., newly organized in Indianapolis, has purchased the plant and equipment of the Glover Equipment Co. and will specialize in the production of seat covers, tire covers, automobile carpets and top covering materials. Associated with E. H. Habig, organizer of the company, is E. J. Herrmann, until recently general director of the Martin-Parry Corp., who will supervise Habig sales through jobbers and dealers.

Vacuumeter Co. has moved to Cleveland and is now in production in that city. The company has arranged to distribute its product through five divisions covering the United States with a resident division manager supervising each division from a factory branch office.

Winnebago Tractor Co. will occupy the Clipper Lawn Mower factory in Dixon, Ill., according to an announcement by N. C. Bennett, president of the company. The plant will employ 40 men and will be occupied as soon as necessary extensions are made.

Century-Plainfield Rubber Co., Inc., whose executive offices are located in New York City, has elected officers as follows: President, Nathaniel Saks; vice-president, Louis J. Franzblau; secretary, Joseph M. Saunders; treasurer, H. C. Sleicher.

Kin-Silite to Be Used in Battery Containers

AKRON, May 28—The Akron Silica Rubber Co. has been formed here to manufacture battery containers and battery accessories from Kin-silite, discovered and perfected by Homer L. Kinsley, formerly of the Goodyear Tire & Rubber Co. An output of 1200 battery boxes a day is planned, the new company having entered into a contract with the Seiberling Rubber Co. to manufacture the products.

Officers of the new company are C. W. McLaughlin, president, who also is a director of the Mohawk Rubber Co.; Mathew Dettleback, vice-president, who is assistant secretary of state; Homer L. Kinsley, secretary, and Dr. L. E. Sisler, vice-president of the Firestone Park Savings & Trust Co., treasurer.

The capital stock of the company consists of 500 shares of 8 per cent preferred stock par value $100, and 2000 shares of no par value common.

METAL MARKETS

Judge Gary's recent declaration that "present selling prices are about right," and his admonition to the steel industry that "we should, if possible, prevent them from going higher notwithstanding the demand is large and urgent," tend to clarify further the steel market outlook. Visible lessening of the tension in the demand during the past few weeks has by no means eliminated the possibility of another buying movement which, no matter how moderate in extent, might have been pyramided into a recrudescent premium market. Short-lived as in all probability such a state of affairs would have been, it would have been harmful to producers and consumers alike.

The leading interest's avowed policy to keep the market on its present level should go far toward steadying the situation, but for all that prices are certain to fluctuate sufficiently from time to time to make it imperative that consumers keep in intimate touch with developments. Why there should be such a hubbub in certain quarters of the steel industry about the untoward effect of recently published market comment is difficult to understand. Every statistical development that has come to notice in May demonstrated that production all along the line has reached very near capacity, and that there has been virtually no fresh buying of any magnitude. Routine orders, of course, have come in and continue to come in, but the relation of supply and demand has undergone a marked change.

A few months ago the volume of orders pouring in on mills showed a spectacular surplus over the output. Today output runs ahead of new orders. For the steel industry to denounce the pointing out of this changed condition as unwarranted "pessimism" shows excessive fear of a misunderstanding of the situation by the consumer. To a considerable extent the uneasiness over published market comment, encountered chiefly among the smaller producers, is explained by the striking disparity between the position of the leading producer at this time and that of the smaller "independents." The former is only now beginning to invoice steel at the prices which Judge Gary characterized as "about right," the backlog of orders at "prices too low for a return on our investments" having been such that it taxed much of the Corporation's capacity while other producers were turning out steel sold at relatively fancy prices. In other words, the intensely prosperous condition of the steel industry of a few months ago is only now beginning to make itself felt on the Corporation's books. The bulk of its backlog of orders now is at satisfactory prices which circumstance goes far toward offsetting possible normal diminution of orders on its books by reason of shipments being in excess of fresh commitments received. On the other hand, some of the smaller producers who have been billing steel at fancy prices during the flurry are now confronted with steadily growing gaps in their order books.

Pig Iron.—The market's softening tendency is generally in evidence but for want of representative transactions has not been translated into corresponding price declines.

Aluminum.—Reports from abroad continue to intimate that the world's leading aluminum producers have reached an "understanding." One report mentions the possibility of an international price pooling of aluminum products. The domestic producer is working at top-notch of capacity.

Copper.—The market is under the influence of speculative maneuvers in London.

Calendar

SHOWS

Sept. 1-7 — Chicago, National Transportation Exhibition, under the auspices of Motor Truck Industries, Coliseum and Annex.

Nov. 4-10 — New York. First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.

FOREIGN SHOWS

May 9 - June 12 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

Oct. 4 - 14 — Paris, Passenger Cars, Bicycles, Motorcycles and Accessories, Grand Palais.

Oct. 15-20—London, Motorcycle Show, Olympia.

Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.

Nov. 1-15—Buenos Aires, Annual Automobile Exposition, under the direction of the Automovil Club Argentino.

Nov. 2-10—London, Automobile Show, Olympia.

Nov. 22-Dec. 1—London, Motor Transport Exhibition.

RACES

July 2 — Tours, French Grand Prix 500-mile race.

Sept. 3—Annual Pikes Peak Hill Climb.

Oct. 28—Barcelona, Spain, Grand Prix for vehicles of 1500 c.c.; Nov. 1, International Grand Prix for cycle cars of 1100—Nov. 4, International Grand Prix for two liter.

CONVENTIONS

June 26 - 27 — Detroit, Annual Convention of Automobile Body Builders Association.

Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of Farm Equipment Manufacturers, Hotel Statler.

Nov. 12-17 — Chicago, Annual Business Exhibit and Convention of the Automotive Equipment Association, Coliseum.

S. A. E. MEETINGS

June 19-23—Summer Meeting of the S. A. E.—Spring Lake, N. J.

Oct. 25-26—Production Meeting of the S. A. E.—Cleveland.

Jan. 1924—Annual Meeting of the S. A. E.—Detroit.

MEETINGS

June 7 — New York, Annual Meeting of the National Automobile Chamber of Commerce.

June 14 - 15 — Bethlehem, Pa., Eastern Sectional Meeting of the American Society for Steel Treating, Hotel Reservations made through George C. Lilly, Superintendent of Heat Treatment, Bethlehem Steel Co., Bethlehem.

June 25-July 1—Dixville Notch, N. H., Summer Meeting of the Automotive Equipment Association.

Fall of French Plane Caused by Backfire

PARIS, May 19 (by *mail*)—After an examination of the wreckage of the Goliath-Renault passenger plane, which fell near Amiens, while on a trip from Paris to London, resulting in the death of the six persons aboard, it has been concluded that the primary cause of the disaster was a backfire from the left-hand engine.

Being under a hood, the fire probably was not immediately noticed by the pilot, and when he became aware of it it was too late to save the machine. The left wing appears to have burned and dropped off, the machine heeled until its right wing was vertical, and then dived from a height of about 2000 ft.

Laurent Eynac, Under-Secretary of State for Aviation, states that a plan is under consideration to equip passenger planes with a device permitting the gasoline tanks to be dropped instantly in case of fire. This device has been tried on war planes with success. With its use provision has to be made for a one-gallon emergency tank to give the pilot a sufficient range of action to seek a landing ground after the main tank has been dropped.

It is claimed that fire is now the only real danger existing on passenger planes. Several accidents having occurred owing to heavily loaded planes overturning when landing, subsidies for excess loads have been abolished by the French Government, with the result that accidents under this heading have been wiped out.

RYAN-BOHN STRIDES FORWARD

DETROIT, May 25—Ryan-Bohn foundry, which is being operated under receivership by J. W. Wilford, as general manager, is reported to be making substantial strides toward recovery, and business is now on a profit-earning basis for the first time in months.

The company makes casting exclusively for automotive users. Increased orders are reported to have been placed by principal customers, among which are Continental, Olds and Reo. Additional machinery is being set up to care for increased business.

Dr. Stratton Recommends Further Standardization

SPRINGFIELD, MASS., May 25—That there are ten positions awaiting every educated engineer in this country, was the statement of Dr. Samuel Wesley Stratton, president of the Massachusetts Institute of Technology and former chief of the United States Bureau of Standards, in addressing 200 members of the Engineering Society of Western Massachusetts at its annual meeting here.

Dr. Stratton urged a more extensive adoption of standardized practice and products on the part of manufacturers. A great advance has already been made in this regard, he said, and the laboratories established by some of the large corporations are a foundation for much further development. Because of the introduction of scientific methods in place of the old inexact standards, he said, American industry can now compete with any nation in the world.

On the occasion of his visit here, Dr. Stratton was taken through the plants of Rolls-Royce of America and the Fisk Rubber Co.

Officers elected by the society are: President, E. E. Lochride; first vice-president, Fred L. Hunt; second vice-president, Henry M. Chase; directors, C. Lincoln Bausman, Neil Currie, Malcolm P. Ryder, George W. Atkinson. The secretary and treasurer will be elected by the official board.

ERIE TRUCK PLANT SOLD

PITTSBURGH, May 25—The plant of the Erie Motor Truck Co. at Erie, Pa., has been sold at public auction for $25,000. About $500,000 was invested in the company, which recently went into the hands of a receiver.

Recovery Unequaled, Says Reserve Board

WASHINGTON, May 26—In analyzing industrial conditions, the Federal Reserve Board believes that "the growth in the physical volume of products since the middle of 1921 indicates a rate of industrial recovery almost without parallel in American business." The business expansion of the automotive industry has been generally characterized as one of the notable features of the progressive movement.

As a reflection of general economic conditions, the board's analysis states:

> The volume of goods produced and consumed during the first quarter of 1923 probably exceeds that of any similar period in the history of the country. Fuller employment of equipment and of labor has produced the additional income from which profits and wages were realized. In fact, profits in many lines of industry have been dependent upon quantity production, the lower production cost per unit more than offsetting the increased cost of materials.
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> It is partly in consequence of larger output that the prices of manufactured goods have not more fully reflected the increases in prices of raw materials. Larger payrolls also until quite recently have resulted chiefly from increased employment rather than from advances in wage rates. These increases in production and employment have thus far economically justified the increases in the total volume of bank credit. For credit extension does not result in over-expansion so long as the additional credit yields proportionate results in the larger production and marketing of goods.

FISHER PLANT NEARLY READY

PONTIAC, MICH., May 28—Production will start in August in the new $2,000,000 plant of the Fisher Body Corp., where all bodies for the Oakland Motor Car Co. will be built. The factory is located within three-quarters of a mile of the Oakland plant in this city, is one and partly two-story construction, built of brick with metal fire-proof sash and of saw-tooth design. It is expected that 2500 men will be employed.